1991 Subject Index—Volume 29

Abbreviations used in this index: BR—Book Review, GR—Good Reading, and L—Letter to the Editor

Announcements, News, and Awards
Physics Organizational Activities
TPT Department: Apparatus
TPT Department: AstroNotes
TPT Department: AV Corner
TPT Department: Book Reviews
TPT Department: Deck the Halls
TPT Department: DOING Physics
TPT Department: Editorial
TPT Department: et cetera
TPT Department: Figuring Physics
TPT Department: Good Reading from Other Journals
TPT Department: How Things Work
TPT Department: In My Opinion
TPT Department: Letters to the Editor
TPT Department: 19th Century Textbook Illustrations
TPT Department: Physics Problems for Physics Teachers
TPT Department: Physics Trick of the Month
TPT Department: Questions Students Ask
TPT Department: SI Notes
TPT Department: String and Sticky Tape
TPT Department: Tricks of the Trade
TPT Department: Would You Believe?
Publications of Lectures
Physics Laboratory Manuals; Secondary Schools
Errors in Physics Classroom Materials
Textbooks for Undergraduates
Textbooks for Students in Grades 9–12
Textbooks for Students in Grades K–8
Books of General Interest to Physics Teachers
Surveys and Tutorial Papers; Resource Letters
Course Design and Evaluation
Science in Secondary School
Curricula and Evaluation
Teaching Methods and Strategies
Learning Theory and Science Teaching
Preservice Teacher Training
Inservice Teacher Training
Audio Visual Aids, Films, Electronic Video Devices
Other Instructional Aids; Posters, Cartoons, Art, etc.
Instructional Computer Use: Classroom
Instructional Computer Use: Laboratory
Computer Software and Software Reviews
Testing Theory and Techniques
Demonstration Experiments and Apparatus
Laboratory Experiments and Apparatus
Laboratory Course Design, Organization, and Evaluation
Buildings and Facilities
General Physics
Biographical, Historical, and Personal Notes
History of Science
Philosophy of Science
Science and Society
Physics of Games and Sports
Careers in Physics and Science
Other Topics of General Interest
Probability Theory, Stochastic Processes, and Statistics
Numerical Approximation and Analysis
Computational Techniques
Other Topics in Mathematical Methods in Physics
Classical Mechanics of Discrete Systems
Special Relativity
Classical Mechanics of Continuous Media
Topics on General Relativity and Gravitation
Measurement and Error Theory
Units
Measurement of Spatial Dimensions
Mass and Density Measurement
Velocity, Acceleration, and Rotation Measurement
Data Handling and Computation
Testing Equipment
Other Topics in Measurement Science, General Laboratory Techniques, and Instrumentation Systems
Transducers
Servo and Control Devices
Vacuum Production and Techniques
Radioactivity and Electromagnetic Transitions
Other Topics in Nuclear Physics
General Topics in Electromagnetic Technology
Electrostatics and Magnetostatics
Currents and Circuits
Steady-State Electromagnetic Fields; Electromagnetic Induction
Other Topics in Electricity and Magnetism
Wave Fronts and Ray Tracing
Edge and Boundary Effects, Refraction
Physiological Optics, Vision
Atmospheric Optics
Optical Sources and Standards
Optical Devices, Techniques, and Applications
Other Topics in Optics
Aeroacoustics, Atmospheric Sound
Music and Musical Instruments
Bioacoustics
Other Topics in Acoustics
Convective and Constrained Heat Transfer
Radiative Heat Transfer
Thermal Properties of Matter
Other Topics in Heat Flow, Thermal and Thermodynamic Processes
Translational Kinematics
Rotational Kinematics
Newton's Laws of Motion
Forces and Torques
Rotational Dynamics
Linear Momentum
Angular Momentum
Momentum Conservation
Mechanical Energy, Work, Power
Energy Conservation
Mass: Gravitational, Inertial, Measurement, Units
Center of Mass and Center of Gravity
Elastic and Inelastic Collisions
Mechanics of Solids and Rheology
Other Topics in Mechanics, Elasticity, and Rheology
Fluid Dynamics: General Theory
Flows in Ducts, Channels, and Conduits
Other Topics in Fluid Dynamics
Kinetic and Transport Theory
Other Topics in the Physics of Fluids
Thermodynamic Properties and Entropy
Optical Properties and Materials
Magnetic Devices
Other Topics in Electrical and Magnetic Devices

Biophysics, Medical Physics, and Biomedical Engineering
Other Areas of General Interest to Physicists
Fundamental Astronomy
Artificial Earth Satellites
Other Topics in Astronomy and Astrophysics
General Topics on the Solar System
General Topics on Stellar Systems; Galactic and Extragalactic Objects and Systems; the Universe
Errata

Month	*Page Nos.*	*Month*	*Page Nos.*
January	1–64	September	321–416
February	65–128	October	417–480
March	129–192	November	481–544
April	193–256	December	545–608
May	257–320		

ANNOUNCEMENTS, NEWS, AND AWARDS

Distinguished Service Citations: Lee Larson, The Slawsky Twins, and Yvette Van Hise, Gerald F. Wheeler; **29**, 210 (1991)

Meet Your New President: Thomas D. Rossing, Joe P. Meyer; **29**, 72 (1991)

The Oersted Medal: Freeman Dyson, Gerald F. Wheeler; **29**, 209 (1991)

The Paul E. Klopsteg Memorial Lecture: Paul Hansma, Judy Franz; **29**, 488 (1991)

Richtmyer Memorial Lecture: Larry Esposito, Gerald F. Wheeler; **29**, 209 (1991)

The Robert A. Millikan Medal: Don Herbert, Judy Franz; **29**, 488 (1991)

Thomas D. Miner 1911–1991, Clifford E. Swartz; **29**, 200 (1991)

APPARATUS

An Alternative Way to Measure Air Density, Robert G. Buschauer; **29**, 114 (1991)

The Automatic Electrophorous, R.A. Morse; **29**, 225 (1991)

A Biconvex Diverging Lens, R.H. Stinson; **29**, 592 (1991)

Charge Amplifier Type of Flux Meter, B.D. Sukheeja and D.K. Kohli; **29**, 283 (1991)

The Hyphenated Siphon, Raymond E. Benenson; **29**, 182 (1991)

Laser-Enhanced Vibrating String, John Abendschan and Dick Speakman; **29**, 114 (1991)

Mechanical Device to Draw Lissajous Figures, O. Herrera; **29**, 283 (1991)

A New Device for Studying Electric Fields, Gary Benoit and Mauri Gould; **29**, 182 (1991)

Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 225 (1991)

Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29**, 369 (1991)

Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29**, 225 (1991)

A Simple Apparatus for Demonstration of Gaseous Diffusion, Roger A. Key and B.D. DePaola; **29**, 522 (1991)

A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; **29**, 468 (1991)

A Sound-Wave Demonstrator—For about $10? Charlotte Farrell; **29**, 182 (1991)

The Transient Phenomena of Forced Vibrations, W. Herreman; **29**, 182 (1991)

Viewer for Brownian Motion, Bill Reid; **29**, 52 (1991)

Wave Interference Patterns Displayed on the Overhead Projector, Richard A. Secco; **29**, 283 (1991)

ASTRONOTES

Daytime Observations for Astronomy Students—I and II, Neil L. Lark; **29**, 459 (1991)

Daytime Observations for Astronomy Students—III, Neil L. Lark; **29**, 500 (1991)

A Demonstration of the Apparent Ellipticity of the Rising or Setting Sun, Jinsong Cui; **29**, 566 (1991)

Determination of the Subsolar Point or (Where on Earth Is the Sun?), Robert Mitchell; **29**, 318 (1991)

How Hot Does Your Parked Car Become? R.H. Garstang; **29**, 58 (1991)

The Orbit of Mercury, Maurice Bruce Stewart; **29**, 346 (1991)

The Regression of the Moon's Nodes: A Major Project in Introductory Astronomy, Maurice Bruce Stewart; **29**, 160 (1991)

Time and the Big Dipper, Larry D. Kirkpatrick; **29**, 80 (1991)

AV CORNER

Demonstrations Videos: Five More, William R. Warren and Marion Emmanuel; **29**, 405 (1991)

Five "Christmas Lectures," Thomas D. Rossing; **29**, 404 (1991)

A "High-Tech" Look with *Voyager*, William Luzader; **29**, 572 (1991)

A Look Beyond, David P. Koch; **29**, 59 (1991)

Slides: A Radio Astronomy View, William Luzader; **29**, 60 (1991)

Slides: SETI, David P. Koch; **29**, 573 (1991)

BOOK REVIEWS

The Art of Construction: Projects and Principles for Beginning Engineers and Architects, M. Salvadori, Chicago Review Press, Chicago, 1990, Thomas D. Miner; **29**, 163 (1991)

Astronomer by Chance, B. Lovell, Basic Books, New York, 1990, Marvin L. De Jong; **29**, 400 (1991)

Chandra: A Biography of S. Chandrasekhar, K.C. Wali, Univ. of Chicago Press, 1991, V.V. Raman; **29**, 399 (1991)

Citizen Scientist, F. von Hippel, American Institute of Physics, NY, 1991, John L. Roeder; **29**, 588 (1991)

Review Essay on *Moments in the Life of a Scientist*, B. Rossi, Cambridge Univ. Press, NY, 1990, V.V. Raman; **29**, 588 (1991)

The Science of Sound, 2nd ed., T.D. Rossing, Addison-Wesley, Reading, MA, 1990, Peter W. Stephens; **29**, 64 (1991)

The Time and Space of Uncle Albert, R. Stannard, Faber & Faber, London, 1989, Henry Holt, NY, 1990, Arthur Eisenkraft; **29**, 163 (1991)

Totality: Eclipses of the Sun, M. Littman and K. Willcox, Univ. of Hawaii Press, Honolulu, HI, 1991, Edward Pascuzzi; **29**, 319 (1991)

What Light Through Yonder Window Breaks? C.F. Bohren, Wiley, New York, 1991, Reuben E. Alley; **29**, 400 (1991)

DECK THE HALLS

Interactive Hallway Physics for Elementary Schools, K. David Pinkerton; **29**, 166 (1991)

Laser Light Fantastic Lissajous Figures, K. David Pinkerton; **29**, 168 (1991)

A Simple Hallway Demonstration of Chaos, Seamus Lagan; **29**, 461 (1991)

EDITORIAL

Ex Cathedra Editoris, Clifford E. Swartz; **29**, 136 (1991)

Extracurricular Fun and Games, Clifford E. Swartz; **29**, 260 (1991)

Heroes, Clifford E. Swartz; **29**, 576 (1991)

More Sage Advice—The High-School Physics Course, Clifford E. Swartz; **29**, 198 (1991)

Physics Boosters, Thomas D. Rossing; **29**, 73 (1991)

A Quantitative Misconception, Clifford E. Swartz; **29**, 486 (1991)

Reference Frames, Clifford E. Swartz; **29**, 420 (1991)

The Rumpelstiltskin Factor, Clifford E. Swartz; **29**, 328 (1991)

What the Student Saw, Clifford E. Swartz; **29**, 12 (1991)

ET CETERA

et cetera, Albert A. Bartlett; **29**, 63, 86, 124, 191, 297, 379, 513, 591 (1991)

FIGURING PHYSICS

The Greater Force of Air Resistance, Paul Hewitt; **29**, 514 (1991)

100-Volt Battery, Paul Hewitt; **29**, 190 (1991)

Speed of Wind, Paul Hewitt; **29**, 49 (1991)

GOOD READING FROM OTHER JOURNALS

Actual and Teacher Perceptions of the Abilities of Mathematical High School Chemistry Students in Minnesota, C.K. Bruce and F. Lawrenz, *Sch. Sci. and Math.*, Jan. 1991, Robert Hetzel; **29**, 446 (1991)

Astrophysics from the Moon, B.F. Burke, *Science*, Dec. 7, 1990, John L. Roeder; **29**, 296 (1991)

Best of What's New, *Pop. Sci.*, Dec. 1990, Robert F. Neff; **29,** 296 (1991)
Closing in on Einstein's Special Relativity Theory, R. Pool, *Science*, Nov. 30, 1990, John L. Roeder; **29,** 296 (1991)
Energy for Planet Earth, *Sci. Am.*, Sept. 1990, Robert F. Neff; **29,** 26 (1991)
Gamma Ray Observatory: The Next Great Observatory in Space, V. Neal, G. Fishman, and D. Kniffen, *Mercury*, July/Aug. 1990, James Stankevitz; **29,** 26 (1991)
General Relativity at 75: How Right Was Einstein? C.M. Will, *Science*, Nov. 9, 1990, John L. Roeder; **29,** 296 (1991)
Hybrid Ferromagnetic-Semiconductor Structures, G.A. Prinz, *Science*, Nov. 23, 1990, John L. Roeder; **29,** 296 (1991)
Magellan Paints a Portrait of Venus, R.A. Kerr, *Science* **251,** March 1, 1991, John L. Roeder; **29,** 446 (1991)
Magnetic Confinement Fusion, H.P. Furth, *Science*, Sept. 28, 1990, John L. Roeder; **29,** 296 (1991)
MRI—Safety Issues Stimulate Concern, L. Bain, *Science* **252,** May 31, 1991, John L. Roeder; **29,** 446 (1991)
Nanotechnology: The Promise and Perils of Ultratiny Machines, J. Roland, *The Futurist*, March–April 1991, Robert F. Neff; **29,** 446 (1991)
The NCTM Curriculum and Evaluation Standards for School Mathematics: A Science Educator's Perspective, H.O. Andersen, *Sch. Sci. and Math.*, Oct. 1990, Robert Hetzel; **29,** 296 (1991)
Research on Science Laboratory Activities: In Pursuit of Better Questions and Answers to Improve Learning, K. Tobin, *Sch. Sci. and Math.*, May 1990, Robert Hetzel; **29,** 26 (1991)
Rock and Roll Bridge, I. Peterson, *Sci. News*, June 2, 1990, Robert F. Neff; **29,** 296 (1991)
Science Literacy: The Enemy Is Us, R. Pool, *Science* **251,** Jan. 18, 1991, John L. Roeder; **29,** 446 (1991)
The Science of Scientific Writing, G.D. Gopen and J.A. Swan, *Am. Sci.*, Nov.–Dec. 1990, Mike Seeds; **29,** 296 (1991)
Weird Science, D.H. Freedman, *Discover*, Nov. 1990, Robert F. Neff; **29,** 296 (1991)
The Woman Who Spins the Stars, M. Bartusiak, *Discover*, Oct. 1990, Robert F. Neff; **29,** 26 (1991)
The Year in Science, *Discover*, Jan. 1991, special issue, Robert F. Neff; **29,** 296 (1991)
The *Z* Boson, M.S. Chanowitz, *Science*, July 6, 1990, John L. Roeder; **29,** 26 (1991)

HOW THINGS WORK

Digital Electronic Balances: Mass or Weight? H. Richard Crane; **29,** 142 (1991)
The Rattleback Revisited, H. Richard Crane; **29,** 278 (1991)
Steam Clock in Gastown, H. Richard Crane; **29,** 450 (1991)
Three Intuition Teasers, H. Richard Crane; **29,** 593 (1991)
What Makes a Fishing Spinner Spin? H. Richard Crane; **29,** 87 (1991)

IN MY OPINION

On the Other Hand..., Patrick LaMaster; **29,** 18 (1991)
Physics Educators and Mathematics Educators Should Work Together, Milton P. Eisner; **29,** 478 (1991)

LETTERS TO THE EDITOR

Additional Uses for High Road/Low Road, Joanne Langabee; **29,** 196 (1991)
All the Answers, John F. Goehl, Jr.; **29,** 70 (1991)
An Alternative Proof, John F. Goehl, Jr.; **29,** 327 (1991)
Another Complication, Robert Allen; **29,** 70 (1991)
Circular Arguments and American Slugs, Malcolm Parry; **29,** 262 (1991)
Clarity, James Stankevitz; **29,** 70 (1991)
Colder than Zero? Barbara S. Andereck; **29,** 485 (1991)
Cribbing, Daniel M. Crowe; **29,** 6 (1991)
Daylight Savings, Jay M. Pasachoff; **29,** 70 (1991)
Does = Mean Equal? Mark M. Payne; **29,** 548 (1991)
Effect of the Moment of Inertia of a Pulley, Stanley P. Morris; **29,** 262 (1991)
Equations Do What They're Told, Scott Saltman; **29,** 262 (1991)
Eschew Obfuscation, Marcelo Alonso; **29,** 549 (1991)
Focusing Attention on the Parabolic Reflector, Samuel Derman; **29,** 327 (1991)
Growth, Saturation, or Something Else? Jay M. Pasachoff; **29,** 550 (1991)
How to Cool an Elephant, Albert A. Bartlett; **29,** 196 (1991)
In Defense of Science Museums, Alan J. Friedman; **29,** 422 (1991)
In Response to Ex Cathedra Editoris, Gary Bender; **29,** 262 (1991)
Interdisciplinary Application, Sam Prytulak; **29,** 134 (1991)
Jerk and the Rotating Observer, Ronald G. Newburgh; **29,** 484 (1991)
Magnetic Images and J.C. Maxwell, Thomas D. Rossing; **29,** 262 (1991)
Make It Apparent, T.R. Sandin; **29,** 327 (1991)
Modifying Newton's Yo-Yo, Jay S. Heubner; **29,** 134 (1991)
More Beats, Terrence P. Toepker; **29,** 548 (1991)
More Leaky Buckets, Richard E. Berg; **29,** 262 (1991)
More on Mirage Formation, J. Wallingford; **29,** 485 (1991)
More Physics Cents, Terrence P. Toepker; **29,** 484 (1991)
Mowat Replies, J. Richard Mowat; **29,** 262 (1991)
Music to My Ears, Henry J. Bartosik; **29,** 70 (1991)
Nonuniform Acceleration Revisited, Robert J. Sciamanda; **29,** 262 (1991)
Not Quite Cricket, Donald L. Shirer; **29,** 262 (1991)
Old Avogadro, John L. Kroening; **29,** 326 (1991)
On Bending and Cribbing, Philip Baumel; **29,** 6 (1991)
Physics for Those Over 60, Virgilio Acosta; **29,** 70 (1991)
Popping Bottom to Top, Albert A. Bartlett; **29,** 326 (1991)
Pushing or Pulling? Igal Galili; **29,** 134 (1991)
Quasi-Static Processes: Some Natural Examples, D.C. Agrawal; **29,** 134 (1991)
Response to Does = Mean Equal? Ralph Baierlein; **29,** 549 (1991)
RLC Phases, Everett Hinton; **29,** 550 (1991)
Sidereal Time, Milton P. Eisner; **29,** 262 (1991)
Summing Not Necessary, Hassan F. Zandy; **29,** 550 (1991)
Thermodynamics in the Real World, Jerry Webb; **29,** 422 (1991)
Three-Dimensional Lissajous Figures, Fred B. Otto; **29,** 197 (1991)
2200 Years Later, Robert Prigo; **29,** 485 (1991)
Two Cultures, Nora McRae, Diane Watson, and Jacqueline Shaver; **29,** 548 (1991)
The Ultimate "Pith Balls," David T. Kagan; **29,** 196 (1991)
Update of a Story, Albert A. Bartlett; **29,** 134 (1991)
Watch Your Pennies!—A Correction, Haym Kruglak; **29,** 262 (1991)
Will AAPT Act? Joseph V. Stewart; **29,** 326 (1991)
Wind Force and Wind Speed, Lewis Epstein; **29,** 196 (1991)

19TH CENTURY TEXTBOOK ILLUSTRATIONS

The Ballistic Pendulum, Thomas B. Greenslade, Jr.; **29,** 415 (1991)

PHYSICS TRICK OF THE MONTH

Balancing a Book, Martin Gardner; **29,** 460 (1991)
Dancing Triangle, Martin Gardner; **29,** 538 (1991)
The Enchanted Die, Martin Gardner; **29,** 587 (1991)
The Frustrating Papers, Martin Gardner; **29,** 416 (1991)
Roly-Poly Folder, Martin Gardner; **29,** 107 (1991)
Stabbing an Eggshell, Martin Gardner; **29,** 149 (1991)
Transporting an Olive, Martin Gardner; **29,** 51 (1991)
The Waltzing Eggshell, Martin Gardner; **29,** 315 (1991)
Where Does the Water Go? Martin Gardner; **29,** 241 (1991)

SI NOTES

Effect of Exercise Expressed in Joules and Watts, Stan Jakuba; **29,** 512 (1991)

STRING AND STICKY TAPE EXPERIMENTS

Crystal Sticks, Ronald D. Edge; **29,** 128 (1991)
A Pointed Demonstration of Surface Tension, Samuel Derman; **29,** 414 (1991)

TRICKS OF THE TRADE

Demonstrations of Infrared Ray Optics with Ray Guns, Richard S. Halada; **29,** 370 (1991)
Electrons and Post-it™trons, Richard S. Halada; **29,** 543 (1991)
Low-cost Implosions, Jerome Holzman; **29,** 429 (1991)

WOULD YOU BELIEVE?
Bad Physics for Geographers, Bill Reid; **29**, 154 (1991)
Levers for Premeds and Children, Mario Iona; **29**, 354 (1991)
Questionable Science, Mario Iona; **29**, 19 (1991)
Problems with Principles of Physics, Mario Iona; **29**, 314 (1991)
Science Fiction for Teachers, Mario Iona; **29**, 528 (1991)

PHYSICS LABORATORY MANUALS: UNDERGRADUATE
Analysis of a Proposed Student Laboratory to Study Nonuniform Acceleration, J. Richard Mowat; **29**, 31 (1991)
Mowat Replies, J. Richard Mowat (L); **29**, 262 (1991)

ERRORS IN PHYSICS CLASSROOM MATERIALS
Bad Physics for Geographers, Bill Reid; **29**, 154 (1991)
Levers for Premeds and Children, Mario Iona; **29**, 354 (1991)
Problems with Principles of Physics, Mario Iona; **29**, 314 (1991)

TEXTBOOKS FOR UNDERGRADUATES
When Words Fail Us, Jerold S. Touger; **29**, 90 (1991)

TEXTBOOKS FOR STUDENTS IN GRADES K–8
Levers for Premeds and Children, Mario Iona; **29**, 354 (1991)

COURSE DESIGN AND EVALUATION
Holography and Introductory Science at Hampshire College, Frederick H. Wirth; **29**, 138 (1991)
The Interdisciplinary Classroom, Kenneth Altshuler; **29**, 428 (1991)
Physics 190—Science Literacy, Kyle Forinash; **29**, 448 (1991)
Should Physics Classes Be Single Sex? Lawrence G. Stowe; **29**, 380 (1991)
Will AAPT Act? Joseph V. Stewart (L); **29**, 326 (1991)

SCIENCE IN ELEMENTARY SCHOOL
Science Fiction for Teachers, Mario Iona; **29**, 528 (1991)

SCIENCE IN SECONDARY SCHOOL
Achievement of U.S. High-School Physics Students, Marilda S. Chandavarkar, Rodney L. Doran, and Willard J. Jacobson; **29**, 387 (1991)
The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29**, 214 (1991)
Estimating the Speed and Distance of an Airplane, Laurence I. Gould and Charles Waiveris; **29**, 108 (1991)
Physics across the Great Divide, Eddie Boyes; **29**, 515 (1991)
Shadow Patterns from Extended Light Sources, William Toews; **29**, 280 (1991)
Should Physics Classes Be Single Sex? Lawrence G. Stowe; **29**, 380 (1991)
The Solar Swan Dive, John S. Dilsaver and Joseph R. Siler; **29**, 28 (1991)
Squirt-Gun Scattering, Steven R. Thompson and Peter Seligmann; **29**, 62 (1991)

CURRICULA AND EVALUATION
Will AAPT Act? Joseph V. Stewart (L); **29**, 326 (1991)

TEACHING METHODS AND STRATEGIES
A Cooperative University—High School Modern Physics Laboratory Experience, David Austen, Wytze Brouwer, John Stephenson, and Terry Singleton; **29**, 14 (1991)
Cross-Cultural Physics, Jane Opalko; **29**, 155 (1991)
An Expanding Universe in the Classroom, David Chandler; **29**, 103 (1991)
First-Day Physics, William B. Lynch; **29**, 336 (1991)
Gravitation as an Early Example of Correspondence, R.R. Boedeker; **29**, 569 (1991)
The Interdisciplinary Classroom, Kenneth Altshuler; **29**, 428 (1991)
It's Kind of Like..., Roger Blickensderfer; **29**, 407 (1991)
A Jolly Project for Teaching Hooke's Law, Jim Glaser; **29**, 164 (1991)
Lenses, Pinholes, Screens, and the Eye, Fred Goldberg, Sharon Bendall, and Igal Galili; **29**, 221 (1991)
The Long List and the Art of Solving Physics Problems, Wendy T. Padgett; **29**, 238 (1991)
Meet Your Classmates in a Vector Contest, Raymond A. Rogoway; **29**, 102 (1991)
Physics across the Great Divide, Eddie Boyes; **29**, 515 (1991)
Physics by Analogy, Jennifer A. Groppe; **29**, 408 (1991)
Physics to the People! J.C. Sprott; **29**, 212 (1991)
Physics Educators and Mathematics Educators Should Work Together, Milton P. Eisner; **29**, 478 (1991)
Poetry in Ice and Spectra, Helen Ormiston-Smith; **29**, 430 (1991)
Should Physics Classes Be Single Sex? Lawrence G. Stowe; **29**, 380 (1991)
The Slawsky Physics Clinic, Milton M. Slawsky and Zaka I. Slawsky; **29**, 244 (1991)
Some Reflections on Plane Mirrors and Images, Igal Galili, Fred Goldberg, and Sharon Bendall; **29**, 471 (1991)
The Sound of Cymbals Crashing, Sal Levy; **29**, 272 (1991)
The Speed of Light in Different Media, Allan Feldman; **29**, 112 (1991)
A Straw Quartet, Meredith B. McCambridge; **29**, 571 (1991)
Student Bodies Exhibiting Constant Acceleration, Stanley J. Sobolewski; **29**, 378 (1991)
Teaching Important Procedures with Simple Experiments, George Matous and John Matolyak; **29**, 541 (1991)
Teaching Newton's Second Law—A Better Way, Douglas A. Kurtze; **29**, 350 (1991)
Teaching Reflection from a Corner Cube Reflector, N.I. Robb; **29**, 255 (1991)
They're All False!—Or Are They? Mark M. Payne; **29**, 145 (1991)
The Transition from High School to College: An Impedance Mismatch? L.O. Dickie and J.E. Farrell; **29**, 440 (1991)
An Unavoidable Collision, T.W. Craig and D. Kiang; **29**, 290 (1991)
Weightlessness and Microgravity, David Chandler; **29**, 312 (1991)
When Words Fail Us, Jerold S. Touger; **29**, 90 (1991)

LEARNING THEORY AND SCIENCE TEACHING
Confusion about Pressure, Dean O. Kuethe; **29**, 20 (1991)
Role Reversal: Laboratory before the Lecture, Wilbur Bergquist; **29**, 75 (1991)
The Transition from High School to College: An Impedance Mismatch? L.O. Dickie and J.E. Farrell; **29**, 440 (1991)
When Words Fail Us, Jerold S. Touger; **29**, 90 (1991)

AUDIO AND VISUAL AIDS, FILMS, ELECTRONIC VIDEO DEVICES
BAFFLE Your Physics Students, Roy W. Clark; **29**, 508 (1991)
Demonstrations Videos: Five More, William R. Warren and Marion Emmanuel; **29**, 405 (1991)
A "High-Tech" Look with *Voyager*, William Luzader; **29**, 572 (1991)
Introductory Videofilms for Physics Laboratory Classes, G.R. Davies; **29**, 36 (1991)
A Look Beyond, David P. Koch; **29**, 59 (1991)
Questionable Science, Mario Iona; **29**, 19 (1991)
Slides: A Radio Astronomy View, William Luzader; **29**, 60 (1991)
Slides: SETI, David P. Koch; **29**, 573 (1991)

OTHER INSTRUCTIONAL AIDS: POSTERS, CARTOONS, ART, ETC.
The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29**, 371 (1991)
The Double-Dactyl Solar System, Ronald Geballe; **29**, 566 (1991)
Electrons and Post-it™trons, Richard S. Halada; **29**, 543 (1991)
An Expanding Universe in the Classroom, David Chandler; **29**, 103 (1991)
The Greater Force of Air Resistance, Paul Hewitt; **29**, 514 (1991)
Monopole Magnets Cartoon, Sidney Harris; **29**, 132 (1991)
"Ohmwork" or Ω $F \times D$, Marshall Ellenstein; **29**, 347 (1991)
More Double Dactyls, Ronald Geballe; **29**, 592 (1991)
1991 Physics All-Stars—December Centerfold, Clifford E. Swartz; **29**, centerfold (1991)
Not Here—Next Door! Cartoon, Sidney Harris; **29**, 461 (1991)
Physics Haiku, Dan Heim; **29**, 158 (1991)
Red, White, Blue, and Black, James C. Kernohan; **29**, 113 (1991)
Science Fiction for Teachers, Mario Iona; **29**, 528 (1991)

INSTRUCTIONAL COMPUTER USE: CLASSROOM

Apple Game-Port Timing, John W. Schwartz and Kathleen Bentzel; **29**, 535 (1991)

Center-of-Mass Baton, Manfred Bucher, Shengbo Zhu, and Randy Dotta-Dovidio; **29**, 74 (1991)

Computer Modeling of Mirage Formation, J.F. Davis and T.B. Greenslade, Jr.; **29**, 47 (1991)

An Unavoidable Collision, T.W. Craig and D. Kiang; **29**, 290 (1991)

INSTRUCTIONAL COMPUTER USE: LABORATORY

Apple Game-Port Timing, John W. Schwartz and Kathleen Bentzel; **29**, 535 (1991)

Checking of Laboratory Data, Donald E. Shult; **29**, 256 (1991)

Function Recognition and Computerized Graphing, John Olson; **29**, 293 (1991)

Graphing with Computers in the Physics Lab, John Feulner; **29**, 126 (1991)

Saving Your Sonic Rangers from Being Smashed, Patrick LaMaster; **29**, 282 (1991)

COMPUTER SOFTWARE AND SOFTWARE REVIEWS

Review of "Interactive Physics," Patrick Tam; **29**, 383 (1991)

TESTING THEORY AND TECHNIQUES

Bungi Jumping, Maglev Trains, and Misaligned Computer Monitors, Scott Whineray; **29**, 39 (1991)

DEMONSTRATION EXPERIMENTS AND APPARATUS

Additional Uses for High Road/Low Road, Joanne Langabee (L); **29**, 196 (1991)

The Airplane Experiment, Lee Larson and Roderick Grant; **29**, 564 (1991)

An Alternative Way to Measure Air Density, Robert G. Buschauer; **29**, 114 (1991)

An Assessment of the PASCO V-Scope, Harold A. Daw; **29**, 304 (1991)

The Automatic Electrophorous, R.A. Morse; **29**, 225 (1991)

The Beer-Can Motor, Bill Reid; **29**, 352 (1991)

A Biconvex Diverging Lens, R.H. Stinson; **29**, 592 (1991)

Boundary Layer Control on Airfoils, George Gerhab and Charles Eastlake; **29**, 150 (1991)

Capacitor Current-Voltage Phase Difference, Robert A. Egler and William M. Mauney; **29**, 398 (1991)

Center-of-Mass Baton, Manfred Bucher, Shengbo Zhu, and Randy Dotta-Dovidio; **29**, 74 (1991)

The Collapsing Can Revisited, James E. Stewart; **29**, 144 (1991)

The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29**, 214 (1991)

A Cycloid Race, Dale T. Hoffman; **29**, 395 (1991)

Demonstration of Magnetic Images, Raymond E. Benenson; **29**, 54 (1991)

A Demonstration of the Apparent Ellipticity of the Rising or Setting Sun, Jinsong Cui; **29**, 566 (1991)

Demonstrations Videos: Five More, William R. Warren and Marion Emmanuel; **29**, 405 (1991)

Determining Absolute Zero in the Kitchen Sink, Robert Otani and Peter Siegel; **29**, 316 (1991)

Do Atoms Really "Emit" Absorption Lines? Kenneth Brecher; **29**, 454 (1991)

Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)

The EME Boyle's Law and Absolute Zero Apparatus, Thomas B. Greenslade, Jr.; **29**, 116 (1991)

First-Day Physics, William B. Lynch; **29**, 336 (1991)

Get the LED Out, John W. Jewett, Jr.; **29**, 530 (1991)

The Hyphenated Siphon, Raymond E. Benenson; **29**, 182 (1991)

Laser-Enhanced Vibrating String, John Abendschan and Dick Speakman; **29**, 114 (1991)

Let's Measure the Dielectric Constant of a Piece of Paper! Edwin A. Karlow; **29**, 23 (1991)

Light Color Mixing: A Convenient "On/Off" Switch, Hughes Pack; **29**, 313 (1991)

Low-cost Implosions, Jerome Holzman; **29**, 429 (1991)

Magnetic Levitation, Thomas D. Rossing and John R. Hull; **29**, 552 (1991)

Mechanical Device to Draw Lissajous Figures, O. Herrera; **29**, 283 (1991)

A New Device for Studying Electric Fields, Gary Benoit and Mauri Gould; **29**, 182 (1991)

The "Physics Is Fun" Program, Jimilyn Welborn; **29**, 436 (1991)

Projecting Spectra for Classroom Investigations, Philip Sadler; **29**, 423 (1991)

Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29**, 369 (1991)

Resurrecting the Pythagorean Monochord, Ben Saferstein; **29**, 438 (1991)

Saving Your Sonic Rangers from Being Smashed, Patrick LaMaster; **29**, 282 (1991)

Shadow Patterns from Extended Light Sources, William Toews; **29**, 280 (1991)

A Simple Apparatus for Demonstration of Gaseous Diffusion, Roger A. Key and B.D. DePaola; **29**, 522 (1991)

A Simple Demonstration of Terminal Velocity, Metin Yersel; **29**, 334 (1991)

A Simple Hallway Demonstration of Chaos, Seamus Lagan; **29**, 461 (1991)

A Sound-Wave Demonstrator—For about $10? Charlotte Farrell; **29**, 182 (1991)

The Speed of Light in Different Media, Allan Feldman; **29**, 112 (1991)

Student Bodies Exhibiting Constant Acceleration, Stanley J. Sobolewski; **29**, 378 (1991)

A Surprising Demonstration of Total Internal Reflection, B.F. Melton; **29**, 539 (1991)

A Tale of Human Power, Sandra K. McPhillips with Maria A. Lynch; **29**, 82 (1991)

Temperature and Color of Incandescent Lamps, William S. Wagner; **29**, 176 (1991)

The Tensile Strength of Paper, D.L. Mathieson; **29**, 412 (1991)

Terminal Velocity on an Air Track, C.W. Tompson and J.L. Wragg; **29**, 178 (1991)

There's More to It than Friction, Uri Haber-Schaim and John H. Dodge; **29**, 56 (1991)

Three-Dimensional Magnetic Field in a Bottle, Richard Cannon; **29**, 311 (1991)

The Transient Phenomena of Forced Vibrations, W. Herreman; **29**, 182 (1991)

Two Cryogenic Demonstrations, Thomas K. McCarthy; **29**, 575 (1991)

The Ultimate "Pith Balls," David T. Kagan (L); **29**, 196 (1991)

Viewer for Brownian Motion, Bill Reid; **29**, 52 (1991)

The V-Scope: An "Oscilloscope" for Motion, Miky Ronen and Aharon Lipman; **29**, 298 (1991)

Watch Your Pennies! Haym Kruglak; **29**, 146 (1991)

Wave Interference Patterns Displayed on the Overhead Projector, Richard A. Secco; **29**, 283 (1991)

LABORATORY EXPERIMENTS AND APPARATUS

Analysis of a Proposed Student Laboratory to Study Nonuniform Acceleration, J. Richard Mowat; **29**, 31 (1991)

An Assessment of the PASCO V-Scope, Harold A. Daw; **29**, 304 (1991)

Capacitor Current-Voltage Phase Difference, Robert A. Egler and William M. Mauney; **29**, 398 (1991)

Charge Amplifier Type of Flux Meter, B.D. Sukheeja and D.K. Kohli; **29**, 283 (1991)

Conservation of Mechanical Energy Using a Pendulum, David G. Willey; **29**, 567 (1991)

A Cycloid Race, Dale T. Hoffman; **29**, 395 (1991)

Effect of the Moment of Inertia of a Pulley, Stanley P. Morris (L); **29**, 262 (1991)

An Expanding Universe in the Classroom, David Chandler; **29**, 103 (1991)

Function Recognition and Computerized Graphing, John Olson; **29**, 293 (1991)

A Jolly Project for Teaching Hooke's Law, Jim Glaser; **29**, 164 (1991)

Mowat Replies, J. Richard Mowat (L); **29**, 262 (1991)

Mystery, Physics, Logic, and Coffee Cans, Richard S. Halada; **29**, 242 (1991)
A 100-Student 15-Minute Lab? Robert Ehrlich; **29**, 586 (1991)
Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 225 (1991)
The Oscilloscope as a Primary Measurement Tool, R. Lee Ponting; **29**, 401 (1991)
Overhead Spectroscopy, George A. Burman; **29**, 470 (1991)
Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29**, 225 (1991)
Resurrecting the Pythagorean Monochord, Ben Saferstein; **29**, 438 (1991)
Shadow Patterns from Extended Light Sources, William Toews; **29**, 280 (1991)
A Simple Experiment that Demonstrates Fractal Behavior, Raphael H. Ko and Charles P. Bean; **29**, 78 (1991)
A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; **29**, 468 (1991)
The Sound of Cymbals Crashing, Sal Levy; **29**, 272 (1991)
Squirt-Gun Scattering, Steven R. Thompson and Peter Seligmann; **29**, 62 (1991)
Terminal Velocity on an Air Track, C.W. Tompson and J.L. Wragg; **29**, 178 (1991)
Tone Holes and Frequency of Open Pipes, Donald E. Shult; **29**, 16 (1991)
Velocity of Sound in Solids, Michael T. Frank and Edward Kluk; **29**, 246 (1991)
The V-Scope: An "Oscilloscope" for Motion, Miky Ronen and Aharon Lipman; **29**, 298 (1991)

LABORATORY COURSE DESIGN, ORGANIZATION, AND EVALUATION

Checking of Laboratory Data, Donald E. Shult; **29**, 256 (1991)

PHYSICS GAMES AND CONTESTS

Balancing a Book, Martin Gardner; **29**, 460 (1991)
Dancing Triangle, Martin Gardner; **29**, 538 (1991)
The Frustrating Papers, Martin Gardner; **29**, 416 (1991)
"Hollywood Squares" Comes to the Physics Room, Patricia Westphal; **29**, 208 (1991)
Meet Your Classmates in a Vector Contest, Raymond A. Rogoway; **29**, 102 (1991)
Roly-Poly Folder, Martin Gardner; **29**, 107 (1991)
Stabbing an Eggshell, Martin Gardner; **29**, 149 (1991)
Student Bodies Exhibiting Constant Acceleration, Stanley J. Sobolewski; **29**, 378 (1991)
Transporting an Olive, Martin Gardner; **29**, 51 (1991)
The Waltzing Eggshell, Martin Gardner; **29**, 315 (1991)
Where Does the Water Go? Martin Gardner; **29**, 241 (1991)

GENERAL PHYSICS

Classical Tunneling, Steve Brown; **29**, 159 (1991)
Convection-Driven Roasting Spits, George W. Ficken, Jr.; **29**, 386 (1991)
DMV Physics—The Case of the Disappearing Time Intervals, John W. Jewett, Jr.; **29**, 563 (1991)
Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)
Hot-Air Ballooning in Physics Teaching, Ole Anton Haugland; **29**, 202 (1991)
More Beats, Terrence P. Toepker (L); **29**, 548 (1991)
A 100-Student 15-Minute Lab? Robert Ehrlich; **29**, 586 (1991)
"Piekara's Chair": Mechanical Model for Atomic Energy Levels, Zofia Golab-Meyer; **29**, 215 (1991)
More Physics Cents, Terrence P. Toepker (L); **29**, 484 (1991)
Power and Efficiency, James N. Boyd; **29**, 457 (1991)
Problems with Principles of Physics, Mario Iona; **29**, 314 (1991)
Questionable Science, Mario Iona; **29**, 19 (1991)
Raindrops Keep Falling on My Head..., Howard E. Evans II; **29**, 120 (1991)
Science Fiction for Teachers, Mario Iona; **29**, 528 (1991)
There's More to It than Friction, Uri Haber-Schaim and John H. Dodge; **29**, 56 (1991)

BIOGRAPHICAL, HISTORICAL, AND PERSONAL NOTES

The Ballistic Pendulum, Thomas B. Greenslade, Jr.; **29**, 415 (1991)
Bohr the Writer, Thomas D. Miner; **29**, 243 (1991)
Interests of Seventeenth-Century Scientists, Thomas D. Miner; **29**, 200 (1991)
The Rocket Experiments of Robert H. Goddard, 1911 to 1930, Brian R. Page; **29**, 490 (1991)
The Transmutation of Rutherford, Thomas D. Miner; **29**, 46 (1991)
"You Remind Me of My Father-in-Law," Nicholas J. Georgis; **29**, 38 (1991)

HISTORY OF SCIENCE

The Ballistic Pendulum, Thomas B. Greenslade, Jr.; **29**, 415 (1991)
Convection-Driven Roasting Spits, George W. Ficken, Jr.; **29**, 386 (1991)
Geometric Kinematics: The Method of Nicole Oresme, Robert C. Fleck, Jr.; **29**, 410 (1991)
The Pendulum Clock, John E. Carlson; **29**, 8 (1991)
Poetry in Ice and Spectra, Helen Ormiston-Smith; **29**, 430 (1991)
The Rocket Experiments of Robert H. Goddard, 1911 to 1930, Brian R. Page; **29**, 490 (1991)
When Words Fail Us, Jerold S. Touger; **29**, 90 (1991)

PHILOSOPHY OF SCIENCE

Teaching Important Procedures with Simple Experiments, George Matous and John Matolyak; **29**, 541 (1991)

SCIENCE AND SOCIETY

The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29**, 371 (1991)
DMV Physics—The Case of the Disappearing Time Intervals, John W. Jewett, Jr.; **29**, 563 (1991)
The Interdisciplinary Classroom, Kenneth Altshuler; **29**, 428 (1991)
It's Kind of Like..., Roger Blickensderfer; **29**, 407 (1991)
The Mathematics of Exponential Growth—Keep It Simple!, Robert H. Romer; **29**, 344 (1991)
The "Physics Is Fun" Program, Jimilyn Welborn; **29**, 436 (1991)
Physics Poetry in a Women's Prison, Ernest Zebrowski, Jr.; **29**, 536 (1991)
Physics to the People! J.C. Sprott; **29**, 212 (1991)
The Rocket Experiments of Robert H. Goddard, 1911 to 1930, Brian R. Page; **29**, 490 (1991)

PHYSICS OF GAMES AND SPORTS

Hot-Air Ballooning in Physics Teaching, Ole Anton Haugland; **29**, 202 (1991)
How Does the Wind Affect Road-Running Achievement? Michael D. de Villiers; **29**, 286 (1991)
A Tale of Human Power, Sandra K. McPhillips with Maria A. Lynch; **29**, 82 (1991)
What's an Ollie?, Brian Broadt, Chris Necochea, and Stephen P. Jacobsen; **29**, 498 (1991)

CAREERS IN PHYSICS AND SCIENCE

Should Physics Classes Be Single Sex? Lawrence G. Stowe; **29**, 380 (1991)

OTHER TOPICS OF GENERAL INTEREST

The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29**, 371 (1991)
If You Understand Leaky Buckets, You Understand a Lot of Physics, Lawrence Ruby; **29**, 44 (1991)
Physics Banner, Robert E. Vermillion; **29**, 355 (1991)
The "Physics Is Fun" Program, Jimilyn Welborn; **29**, 436 (1991)
The Physics of Popping Popcorn, Robert G. Hunt; **29**, 230 (1991)
Physics Poetry in a Women's Prison, Ernest Zebrowski, Jr.; **29**, 536 (1991)
Teaching Important Procedures with Simple Experiments, George Matous and John Matolyak; **29**, 541 (1991)

ALGEBRA, SET THEORY, AND GRAPH THEORY
How Does the Wind Affect Road-Running Achievement? Michael D. de Villiers; **29**, 286 (1991)

GEOMETRY, DIFFERENTIAL GEOMETRY, AND TOPOLOGY
Geometric Kinematics: The Method of Nicole Oresme, Robert C. Fleck, Jr.; **29**, 410 (1991)

PROBABILITY THEORY, STOCHASTIC PROCESSES, AND STATISTICS
A Simple Experiment that Demonstrates Fractal Behavior, Raphael H. Ko and Charles P. Bean; **29**, 78 (1991)

COMPUTATIONAL TECHNIQUES
Classical Tunneling, Steve Brown; **29**, 159 (1991)
When Is a Problem Finished? Daryl Blakeslee and Thomas A. Walkiewicz; **29**, 464 (1991)

OTHER TOPICS IN MATHEMATICAL METHODS IN PHYSICS
Different Magnitude Differences, E.S. Oberhofer; **29**, 273 (1991)
If You Understand Leaky Buckets, You Understand a Lot of Physics, Lawrence Ruby; **29**, 44 (1991)
Physics Educators and Mathematics Educators Should Work Together, Milton P. Eisner; **29**, 478 (1991)
Power and Efficiency, James N. Boyd; **29**, 457 (1991)
A Simple Experiment that Demonstrates Fractal Behavior, Raphael H. Ko and Charles P. Bean; **29**, 78 (1991)

CLASSICAL MECHANICS OF DISCRETE SYSTEMS
Jerk and the Rotating Observer, Ronald G. Newburgh (L); **29**, 484 (1991)
An Unavoidable Collision, T.W. Craig and D. Kiang; **29**, 290 (1991)

SPECIAL RELATIVITY
The Relativistic Velocity Addition Formula, Robert W. Flynn; **29**, 524 (1991)
Teaching $E = mc^2$: An Exploration of Some Issues, Ralph Baierlein; **29**, 170 (1991)

QUANTUM MECHANICS
"Piekara's Chair": Mechanical Model for Atomic Energy Levels, Zofia Golab-Meyer; **29**, 215 (1991)

TOPICS ON GENERAL RELATIVITY AND GRAVITATION
Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)
Gravitation as an Early Example of Correspondence, R.R. Boedeker; **29**, 569 (1991)
Space Curvature and the "Heavy Banana 'Paradox,'" Ronald P. Gruber, Alicia D. Gruber, Russell Hamilton, and Stephen M. Matthews; **29**, 147 (1991)

KINETIC THEORY
Viewer for Brownian Motion, Bill Reid; **29**, 52 (1991)

MEASUREMENT AND ERROR THEORY
Optimum Setting of a Slide Wire Wheatstone Bridge, Benjamin J. Pernick; **29**, 35 (1991)
Resurrecting the Pythagorean Monochord, Ben Saferstein; **29**, 438 (1991)

DETERMINATION OF FUNDAMENTAL CONSTANTS
Millikan without the Eyestrain, Steve Brehmer; **29**, 310 (1991)
A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; **29**, 468 (1991)

MEASUREMENT OF SPATIAL DIMENSIONS
An Assessment of the PASCO V-Scope, Harold A. Daw; **29**, 304 (1991)
More Physics Cents, Terrence P. Toepker (L); **29**, 484 (1991)
The Plane Went Astray, Albert A. Bartlett; **29**, 152 (1991)
Two Strings of Pearls, Albert A. Bartlett and Chris Zafiratos; **29**, 30 (1991)
The V-Scope: An "Oscilloscope" for Motion, Miky Ronen and Aharon Lipman; **29**, 298 (1991)

MASS AND DENSITY MEASUREMENT
An Alternative Way to Measure Air Density, Robert G. Buschauer; **29**, 114 (1991)
Digital Electronic Balances: Mass or Weight? H. Richard Crane; **29**, 142 (1991)
A Jolly Project for Teaching Hooke's Law, Jim Glaser; **29**, 164 (1991)
More Physics Cents, Terrence P. Toepker (L); **29**, 484 (1991)

TIME AND FREQUENCY MEASUREMENT
More Beats, Terrence P. Toepker (L); **29**, 548 (1991)
The Pendulum Clock, John E. Carlson; **29**, 8 (1991)
Resurrecting the Pythagorean Monochord, Ben Saferstein; **29**, 438 (1991)

VELOCITY, ACCELERATION, AND ROTATION MEASUREMENT
Analysis of a Proposed Student Laboratory to Study Nonuniform Acceleration, J. Richard Mowat; **29**, 31 (1991)
How to Measure g Easily with $\approx 10^{-4}$ Precision in the Beginners' Lab, Fritz Schoch and Walter Winiger; **29**, 98 (1991)
Instantaneous Velocity: A Different Approach, Edwin Kaiser; **29**, 394 (1991)
A Simple Demonstration of Terminal Velocity, Metin Yersel; **29**, 334 (1991)

MEASUREMENT OF BASIC ELECTROMAGNETIC QUANTITIES
Millikan without the Eyestrain, Steve Brehmer; **29**, 310 (1991)

DATA HANDLING AND COMPUTATION
Apple Game-Port Timing, John W. Schwartz and Kathleen Bentzel; **29**, 535 (1991)

DISPLAY, RECORDING, AND INDICATING INSTRUMENTS
Millikan without the Eyestrain, Steve Brehmer; **29**, 310 (1991)

OTHER TOPICS IN MEASUREMENT SCIENCE, GENERAL LABORATORY TECHNIQUES, AND INSTRUMENTATION SYSTEMS
Fractal Bread, Donald H. Esbenshade, Jr.; **29**, 236 (1991)
A 100-Student 15-Minute Lab?, Robert Ehrlich; **29**, 586 (1991)

ELECTRICAL INSTRUMENTS AND TECHNIQUES
The Oscilloscope as a Primary Measurement Tool, R. Lee Ponting; **29**, 401 (1991)

OPTICAL INSTRUMENTS AND TECHNIQUES
The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29**, 214 (1991)
Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 225 (1991)

PHOTOGRAPHY, PHOTOGRAPHIC INSTRUMENTS, AND TECHNIQUES
High-Speed Photography with Computer Control, Loren M. Winters; **29**, 356 (1991)
The Plane Went Astray, Albert A. Bartlett; **29**, 152 (1991)

OTHER TOPICS IN ELEMENTARY PARTICLES AND FIELDS
Physical Principles of Particle Detectors, Goronwy Tudor Jones; **29**, 578 (1991)

NUCLEAR REACTIONS AND SCATTERING: GENERAL
Estimating the Nuclear Radius, Neil M. Shea; **29**, 237 (1991)

NUCLEAR REACTIONS AND SCATTERING: SPECIFIC
Estimating the Nuclear Radius, Neil M. Shea; **29**, 237 (1991)

EXPERIMENTAL METHODS AND INSTRUMENTATION FOR ELEMENTARY PARTICLE AND NUCLEAR PHYSICS
Physical Principles of Particle Detectors, Goronwy Tudor Jones; **29**, 578 (1991)

OTHER TOPICS IN NUCLEAR PHYSICS
Estimating the Nuclear Radius, Neil M. Shea; **29**, 237 (1991)

GENERAL TOPICS IN ELECTROMAGNETIC TECHNOLOGY
Demonstration of Magnetic Images, Raymond E. Benenson; **29**, 54 (1991)
Magnetic Levitation, Thomas D. Rossing and John R. Hull; **29**, 552 (1991)

ELECTROSTATICS AND MAGNETOSTATICS
The Automatic Electrophorous, R.A. Morse; **29**, 225 (1991)

Capacitors in Parallel and Series, Helene F. Perry, Randall S. Jones, and Gregory N. Derry; **29,** 348 (1991)

A Different Light on an Old Electrostatics Demonstration, William Layton; **29,** 50 (1991)

The Ultimate "Pith Balls," David T. Kagan (L); **29,** 196 (1991)

STEADY STATE ELECTROMAGNETIC FIELDS, ELECTROMAGNETIC INDUCTION

Magnetic Levitation, Thomas D. Rossing and John R. Hull; **29,** 552 (1991)

CURRENTS AND CIRCUITS

Application of the Superposition Principle, M.A.R.P. de Barros; **29,** 107 (1991)

Temperature and Color of Incandescent Lamps, William S. Wagner; **29,** 176 (1991)

OTHER TOPICS IN ELECTRICITY AND MAGNETISM

Spark Student Interest with a Piezoelectric Demonstration, Kaye M. Elsner and Craig Anderson; **29,** 510 (1991)

Charge Amplifier Type of Flux Meter, B.D. Sukheeja and D.K. Kohli; **29,** 283 (19910

PROPAGATION AND TRANSMISSION IN HOMOGENEOUS MEDIA

The Speed of Light in Different Media, Allan Feldman; **29,** 112 (1991)

WAVE FRONTS AND RAY TRACING

A Demonstration of the Apparent Ellipticity of the Rising or Setting Sun, Jinsong Cui; **29,** 566 (1991)

The Mystery of the Negative Pinhole, James E. Stewart; **29,** 520 (1991)

Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29,** 369 (1991)

Ray Tracing with Virtual Objects, Stuart Leinoff; **29,** 275 (1991)

Reflective Properties of a Parabolic Mirror, Gordon P. Ramsey; **29,** 240 (1991)

EDGE AND BOUNDARY EFFECTS, REFRACTION

A Biconvex Diverging Lens, R.H. Stinson; **29,** 592 (1991)

Demonstrations of Infrared Ray Optics with Ray Guns, Richard S. Halada; **29,** 370 (1991)

A Surprising Demonstration of Total Internal Reflection, B.F. Melton; **29,** 539 (1991)

DIFFRACTION AND SCATTERING FROM EXTENDED BODIES

Index of Refraction Using a Diffraction Pattern in a Fishtank, Simon George and Robert Doebler; **29,** 462 (1991)

Overhead Spectroscopy, George A. Burman; **29,** 470 (1991)

ABSORPTION

Absorption by Blue and Red Filters, Harry Rheam; **29,** 382 (1991)

OPTICAL INFORMATION, IMAGE FORMATION, AND ANALYSIS

The Mystery of the Negative Pinhole, James E. Stewart; **29,** 520 (1991)

HOLOGRAPHY

Holography and Introductory Science at Hampshire College, Frederick H. Wirth; **29,** 138 (1991)

LASER SYSTEMS AND LASER BEAM APPLICATIONS

Index of Refraction Using a Diffraction Pattern in a Fishtank, Simon George and Robert Doebler; **29,** 462 (1991)

Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29,** 225 (1991)

PHYSIOLOGICAL OPTICS, VISION

Cow's Eye Dissection in the Physics Lab, David R. Lapp and James E. Keenan; **29,** 502 (1991)

ATMOSPHERIC OPTICS

Computer Modeling of Mirage Formation, J.F. Davis and T.B. Greenslade, Jr.; **29,** 47 (1991)

OPTICAL LENS AND MIRROR SYSTEMS

Lenses, Pinholes, Screens, and the Eye, Fred Goldberg, Sharon Bendall, and Igal Galili; **29,** 221 (1991)

Reflective Properties of a Parabolic Mirror, Gordon P. Ramsey; **29,** 240 (1991)

Some Reflections on Plane Mirrors and Images, Igal Galili, Fred Goldberg, and Sharon Bendall; **29,** 471 (1991)

Teaching Reflection from a Corner Cube Reflector, N.I. Robb; **29,** 255 (1991)

OPTICAL DEVICES, TECHNIQUES, AND APPLICATIONS

Index of Refraction Using a Diffraction Pattern in a Fishtank, Simon George and Robert Doebler; **29,** 462 (1991)

Overhead Spectroscopy, George A. Burman; **29,** 470 (1991)

A Photographer's Rule-of-Thumb, Richard L. Childers; **29,** 292 (1991)

OTHER TOPICS IN OPTICS

You Can Be Myopic and Still Survive on a Desert Island! James K. Huhn; **29,** 577 (1991)

MUSIC AND MUSICAL INSTRUMENTS

A Straw Quartet, Meredith B. McCambridge; **29,** 571 (1991)

HEAT CONDUCTION

Temperature and Color of Incandescent Lamps, William S. Wagner; **29,** 176 (1991)

CONVECTIVE AND CONSTRAINED HEAT TRANSFER

Convection-Driven Roasting Spits, George W. Ficken, Jr.; **29,** 386 (1991)

Nature's Heat Exchangers, George Barnes; **29,** 330 (1991)

RADIATIVE HEAT TRANSFER

Nature's Heat Exchangers, George Barnes; **29,** 330 (1991)

THERMAL PROPERTIES OF MATTER

The Physics of Popping Popcorn, Robert G. Hunt; **29,** 230 (1991)

THERMODYNAMIC PROCESSES

The Collapsing Can Revisited, James E. Stewart; **29,** 144 (1991)

The "Sadly Cannot" Thermodynamic Cycle Revisited, David S. Mills and Craig S. Huston; **29,** 180 (1991)

OTHER TOPICS IN HEAT FLOW, THERMAL AND THERMODYNAMIC PROCESSES

Thermodynamics in the Real World, Jerry Webb (L); **29,** 422 (1991)

TRANSLATIONAL KINEMATICS

Analysis of a Proposed Student Laboratory to Study Nonuniform Acceleration, J. Richard Mowat; **29,** 31 (1991)

Boundary Conditions in Elementary Mechanics, Alejandro D. Gonzàlez; **29,** 590 (1991)

DMV Physics—The Case of the Disappearing Time Intervals, John W. Jewett, Jr.; **29,** 563 (1991)

Geometric Kinematics: The Method of Nicole Oresme, Robert C. Fleck, Jr.; **29,** 410 (1991)

How to Measure g Easily with $\approx 10^{-4}$ Precision in the Beginners' Lab, Fritz Schoch and Walter Winiger; **29,** 98 (1991)

Instantaneous Velocity: A Different Approach, Edwin Kaiser; **29,** 394 (1991)

Mowat Replies, J. Richard Mowat (L); **29,** 262 (1991)

Nonuniform Acceleration Revisited, Robert J. Sciamanda (L); **29,** 262 (1991)

Projectiles in Circular Orbits, S.K. Bose; **29,** 568 (1991)

The Solar Swan Dive, John S. Dilsaver and Joseph R. Siler; **29,** 28 (1991)

Student Bodies Exhibiting Constant Acceleration, Stanley J. Sobolewski; **29,** 378 (1991)

Terminal Velocity on an Air Track, C.W. Tompson and J.L. Wragg; **29,** 178 (1991)

ROTATIONAL KINEMATICS

Jerk and the Rotating Observer, Ronald G. Newburgh (L); **29,** 484 (1991)

Projectiles in Circular Orbits, S.K. Bose; **29,** 568 (1991)

NEWTON'S LAWS OF MOTION

Force Components, the Last Straw, Kenneth Fox; **29,** 118 (1991)

Jerk and the Rotating Observer, Ronald G. Newburgh (L); **29,** 484 (1991)

Which Way Was that Paint Truck Moving? John Schutter; **29,** 574 (1991)

FORCES AND TORQUES
The Collapsing Can Revisited, James E. Stewart; **29,** 144 (1991)
Study of Projectile Motion by Angular Momentum and Torque, B. Bagchi and Paul Holody; **29,** 376 (1991)

ROTATIONAL DYNAMICS
The Airplane Experiment, Lee Larson and Roderick Grant; **29,** 564 (1991)
Jerk and the Rotating Observer, Ronald G. Newburgh (L); **29,** 484 (1991)
The Rattleback Revisited, H. Richard Crane; **29,** 278 (1991)

LINEAR MOMENTUM
Classical Tunneling, Steve Brown; **29,** 159 (1991)

ANGULAR MOMENTUM
Study of Projectile Motion by Angular Momentum and Torque, B. Bagchi and Paul Holody; **29,** 376 (1991)

MOMENTUM CONSERVATION
Force Components, the Last Straw, Kenneth Fox; **29,** 118 (1991)

ENERGY CONSERVATION
Conservation of Mechanical Energy Using a Pendulum, David G. Willey; **29,** 567 (1991)

MECHANICS OF DISCRETE SYSTEMS
The Long List and the Art of Solving Physics Problems, Wendy T. Padgett; **29,** 238 (1991)

ELASTIC AND INELASTIC COLLISIONS
Equations Do What They're Told, Scott Saltman (L); **29,** 262 (1991)

VIBRATIONS AND MECHANICAL WAVES
Listening for Young's Modulus, James E. Kettler; **29,** 538 (1991)
A Sound-Wave Demonstrator—For about $10? Charlotte Farrell; **29,** 182 (1991)

OTHER TOPICS IN MECHANICS, ELASTICITY, AND RHEOLOGY
Projectiles in Circular Orbits, S.K. Bose; **29,** 568 (1991)

LAMINAR FLOWS
Boundary Layer Control on Airfoils, George Gerhab and Charles Eastlake; **29,** 150 (1991)

REACTIVE, RADIATIVE, OR NONEQUILIBRIUM FLOWS
Boundary Layer Control on Airfoils, George Gerhab and Charles Eastlake; **29,** 150 (1991)

OTHER TOPICS IN FLUID DYNAMICS
What Makes a Fishing Spinner Spin? H. Richard Crane; **29,** 87 (1991)

VISCOSITY AND DIFFUSION: EXPERIMENTAL
A Simple Apparatus for Demonstration of Gaseous Diffusion, Roger A. Key and B.D. DePaola; **29,** 522 (1991)

THERMAL PROPERTIES OF GASES
Determining Absolute Zero in the Kitchen Sink, Robert Otani and Peter Siegel; **29,** 316 (1991)

MECHANICAL PROPERTIES OF LIQUIDS
An Estimate of Avogadro's Number, Frederic R. Stauffer; **29,** 252 (1991)

ELASTIC CONSTANTS
Listening for Young's Modulus, James E. Kettler; **29,** 538 (1991)

THERMODYNAMIC EXPANSION AND THERMOMECHANICAL EFFECTS
An Estimate of Avogadro's Number, Frederic R. Stauffer; **29,** 252 (1991)

OTHER TOPICS IN THERMAL PROPERTIES OF CONDENSED MATTER
Two Cryogenic Demonstrations, Thomas K. McCarthy; **29,** 575 (1991)

DIELECTRIC PROPERTIES AND MATERIALS
Let's Measure the Dielectric Constant of a Piece of Paper! Edwin A. Karlow; **29,** 23 (1991)

VISIBLE AND ULTRAVIOLET SPECTRA
Do Atoms Really "Emit" Absorption Lines? Kenneth Brecher; **29,** 454 (1991)
Overhead Spectroscopy, George A. Burman; **29,** 470 (1991)
Red, White, Blue, and Black, James C. Kernohan; **29,** 113 (1991)

SEMICONDUCTOR DEVICES
A New Device for Studying Electric Fields, Gary Benoit and Mauri Gould; **29,** 182 (1991)

OTHER TOPICS IN ELECTRICAL AND MAGNETIC DEVICES
Three-Dimensional Magnetic Field in a Bottle, Richard Cannon; **29,** 311 (1991)

BIOPHYSICS, MEDICAL PHYSICS, AND BIOMEDICAL ENGINEERING
Nature's Heat Exchangers, George Barnes; **29,** 330 (1991)
What Teachers Should Know about Radon, Clifford Bettis and Carl Throckmorton; **29,** 338 (1991)

ENERGY RESOURCES
The Mathematics of Exponential Growth—Keep It Simple! Robert H. Romer; **29,** 344 (1991)

DIRECT ENERGY CONVERSION AND ENERGY STORAGE
Spark Student Interest with a Piezoelectric Demonstration, Kaye M. Elsner and Craig Anderson; **29,** 510 (1991)

GEOPHYSICAL OBSERVATIONS, INSTRUMENTATION, AND TECHNIQUES
Different Magnitude Differences, E.S. Oberhofer; **29,** 273 (1991)

OTHER AREAS OF GENERAL INTEREST TO PHYSICISTS
The Rocket Experiments of Robert H. Goddard, 1911 to 1930, Brian R. Page; **29,** 490 (1991)

FUNDAMENTAL ASTRONOMY
Daytime Observations for Astronomy Students—I and II, Neil L. Lark; **29,** 459 (1991)
Daytime Observations for Astronomy Students—III, Neil L. Lark; **29,** 500 (1991)
If the Sun Were a Light Bulb, Kenneth J. Adney; **29,** 96 (1991)
Slides: A Radio Astronomy View, William Luzader; **29,** 59 (1991)
Slides: SETI, David P. Koch; **29,** 573 (1991)

FUNDAMENTAL ASPECTS OF ASTROPHYSICS
The Formation of a Planetary Nebula, Amos Harpaz; **29,** 268 (1991)
The Solar Swan Dive, John S. Dilsaver and Joseph R. Siler; **29,** 28 (1991)

ASTRONOMICAL AND SPACE RESEARCH INSTRUMENTATION
A Look Beyond, David P. Koch; **29,** 59 (1991)
The Rocket Experiments of Robert H. Goddard, 1911 to 1930, Brian R. Page; **29,** 490 (1991)

OBSERVATION AND REDUCTION TECHNIQUES
The Orbit of Mercury, Maurice Bruce Stewart; **29,** 346 (1991)
The Regression of the Moon's Nodes: A Major Project in Introductory Astronomy, Maurice Bruce Stewart; **29,** 160 (1991)

ASTRONOMICAL OBSERVATIONS
Determination of the Subsolar Point or (Where on Earth Is the Sun?), Robert Mitchell; **29,** 318 (1991)
How Hot Does Your Parked Car Become? R.H. Garstang; **29,** 58 (1991)
If the Sun Were a Light Bulb, Kenneth J. Adney; **29,** 96 (1991)
The Regression of the Moon's Nodes: A Major Project in Introductory Astronomy, Maurice Bruce Stewart; **29,** 160 (1991)
Time and the Big Dipper, Larry D. Kirkpatrick; **29,** 80 (1991)
Totality: Eclipses of the Sun, M. Littman and K. Willcox, Univ. of Hawaii Press, Honolulu, HI, 1991, Edward Pascuzzi (BR); **29,** 319 (1991)

OTHER TOPICS IN ASTRONOMY AND ASTROPHYSICS
Different Magnitude Differences, E.S. Oberhofer; **29,** 273 (1991)
The Orbit of Mercury, Maurice Bruce Stewart; **29,** 346 (1991)
The Regression of the Moon's Nodes: A Major Project in Introductory Astronomy, Maurice Bruce Stewart; **29,** 160 (1991)

GENERAL TOPICS ON THE SOLAR SYSTEM
Daytime Observations for Astronomy Students—I and II, Neil L. Lark; **29,** 459 (1991)
Daytime Observations for Astronomy Students—III, Neil L. Lark; **29,** 500 (1991)

1991 Author Index—Volume 29

Abbreviations used in this index: BR—Book Review, GR—Good Reading, and L—Letter to the Editor

Abendschan, John, Laser-Enhanced Vibrating String, John Abendschan and Dick Speakman; **29,** 114 (1991)

Acosta, Virgilio, Physics for Those Over 60 (L); **29,** 70 (1991)

Adney, Kenneth J., If the Sun Were a Light Bulb; **29,** 96 (1991)

Agrawal, D.C., Quasi-Static Processes: Some Natural Examples (L), D.C. Agrawal and V.J. Menon; **29,** 135 (1991)

Allen, Robert, Another Complication (L); **29,** 71 (1991)

Alley, Reuben E., *What Light Through Yonder Window Breaks?* C.F. Bohren, Wiley, New York, 1991 (BR); **29,** 400 (1991)

Alonso, Marcelo, Eschew Obfuscation (L); **29,** 549 (1991)

Altshuler, Kenneth, The Interdisciplinary Classroom; **29,** 428 (1991)

Andereck, Barbara S., Colder than Zero? (L); **29,** 485 (1991)

Anderson, Craig, Spark Student Interest with a Piezoelectric Demonstration, Kaye M. Elsner and Craig Anderson; **29,** 510 (1991)

Austen, David, A Cooperative University-High School Modern Physics Laboratory Experience, David Austen, Wytze Brouwer, John Stephenson, and Terry Singleton; **29,** 14 (1991)

Ayres, Thomas R., The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29,** 371 (1991)

Bagchi, B., Study of Projectile Motion by Angular Momentum and Torque, B. Bagchi and Paul Holody; **29,** 376 (1991)

Baierlein, Ralph, Teaching $E = mc^2$: An Exploration of Some Issues; **29,** 170 (1991)

Reply to Does = Mean Equal? (L); **29,** 549 (1991)

Barnes, George, Nature's Heat Exchangers; **29,** 330 (1991)

Bartlett, Albert A., Two Strings of Pearls, Albert A. Bartlett and Chris Zafiratos; **29,** 30 (1991)

et cetera; **29,** 63, 86, 124, 191, 297, 379, 513, 591 (1991)

Update of a Story (L); **29,** 135 (1991)

The Plane Went Astray; **29,** 152 (1991)

How to Cool an Elephant (L); **29,** 196 (1991)

Popping Bottom to Top (L); **29,** 326 (1991)

Bartosik, Henry J., Music to My Ears (L); **29,** 70 (1991)

Bass, Ronald S., The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29,** 371 (1991)

Baumel, Philip, On Bending and Cribbing (L); **29,** 6 (1991)

Bean, Charles P., A Simple Experiment that Demonstrates Fractal Behavior, Raphael H. Ko and Charles P. Bean; **29,** 78 (1991)

Bendall, Sharon, Lenses, Pinholes, Screens, and the Eye, Fred Goldberg, Sharon Bendall, and Igal Galili; **29,** 221 (1991)

Some Reflections on Plane Mirrors and Images, Igal Galili, Fred Goldberg, and Sharon Bendall; **29,** 471 (1991)

Bender, Gary, In Response to Ex Cathedra Editoris (L); **29,** 262 (1991)

Benenson, Raymond E., Demonstration of Magnetic Images; **29,** 54 (1991)

The Hyphenated Siphon; **29,** 188 (1991)

Benn, Jomo, Which Mirror Did That? **29,** 529 (1991)

Bennett, Jeffrey O., The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29,** 371 (1991)

Benoit, Gary, A New Device for Studying Electric Fields, Gary Benoit and Mauri Gould; **29,** 182 (1991)

Bentzel, Kathleen, Apple Game-Port Timing, John W. Schwartz and Kathleen Bentzel; **29,** 535 (1991)

Berg, Richard E., More Leaky Buckets (L); **29,** 266 (1991)

Bergquist, Wilbur, Role Reversal: Laboratory before the Lecture; **29,** 75 (1991)

Bettis, Clifford, What Teachers Should Know about Radon, Clifford Bettis and Carl Throckmorton; **29,** 338 (1991)

Bissonnette, D., The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29,** 214 (1991)

Blakeslee, Daryl, When Is a Problem Finished? Daryl Blakeslee and Thomas A. Walkiewicz; **29,** 464 (1991)

Blickensderfer, Roger, It's Kind of Like...; **29,** 407 (1991)

Boedeker, R.R., Gravitation as an Early Example of Correspondence; **29,** 569 (1991)

Bose, S.K., Projectiles in Circular Orbits; **29,** 568 (1991)

Boyd, James N., Power and Efficiency; **29,** 457 (1991)

Boyes, Eddie, Physics across the Great Divide; **29,** 515 (1991)

Brecher, Kenneth, Do Atoms Really "Emit" Absorption Lines? **29,** 454 (1991)

Brehmer, Steve, Millikan without the Eyestrain; **29,** 310 (1991)

Broadt, Brian, What's an Ollie? Brian Broadt, Chris Necochea, and Stephen P. Jacobsen; **29,** 498 (1991)

Brouwer, Wytze, A Cooperative University-High School Modern Physics Laboratory Experience, David Austen, Wytze Brouwer, John Stephenson, and Terry Singleton; **29,** 14 (1991)

Brown, Steve, Classical Tunneling; **29,** 159 (1991)

Bucher, Manfred, Center-of-Mass Baton, Manfred Bucher, Shengbo Zhu, and Randy Dotta-Dividio; **29,** 74 (1991)

Burman, George A., Overhead Spectroscopy; **29,** 470 (1991)

Buschauer, Robert G., An Alternative Way to Measure Air Density; **29,** 115 (1991)

Cannon, Richard, Three-Dimensional Magnetic Field in a Bottle; **29,** 311 (1991)

Carlson, John E., The Pendulum Clock; **29,** 8 (1991)

Carter, Matthew F., The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29,** 371 (1991)

Center, Kenneth B., The Colorado Scale-Model Solar System, Jeffrey O. Bennett, Thomas R. Ayres, Kenneth B. Center, Matthew F. Carter, and Ronald S. Bass; **29,** 371 (1991)

Chandavarkar, Marilda S., Achievement of U.S. High-School Physics Students, Marilda S. Chadavarkar, Rodney L. Doran, and Willard J. Jacobson; **29,** 387 (1991)

Chandler, David, An Expanding Universe in the Classroom; **29,** 103 (1991)

Weightlessness and Microgravity; **29,** 312 (1991)

Childers, Richard L., A Photographer's Rule-of-Thumb; **29,** 292 (1991)

Clark, Roy W., BAFFLE Your Physics Students; **29,** 508 (1991)

Craig, T.W., An Unavoidable Collision, T.W. Craig and D. Kiang; **29,** 290 (1991)

Crane, H. Richard, What Makes a Fishing Spinner Spin? **29,** 87 (1991)

Digital Electronic Balances: Mass or Weight? **29,** 142 (1991)

The Rattleback Revisited; **29,** 278 (1991)

Steam Clock in Gastown; **29,** 450 (1991)

Three Intuition Teasers; **29,** 593 (1991)

Crowe, Daniel M., Cribbing (L); **29,** 6 (1991)

Cui, Jinsong, A Demonstration of the Apparent Ellipticity of the Rising or Setting Sun; **29,** 566 (1991)

Davies, G.R., Introductory Videofilms for Physics Laboratory Classes; **29,** 36 (1991)

Davis, J.F., Computer Modeling of Mirage Formation, J.F. Davis and T.B. Greenslade, Jr.; **29,** 47 (1991)

Daw, Harold A., An Assessment of the PASCO V-Scope; **29,** 304 (1991)

de Barros, M.A.R.P., Application of the Superposition Principle; **29,** 107 (1991)

De Jong, Marvin L., *Astronomer by Chance*, B. Lovell, Basic Books, New York, 1990 (BR); **29,** 400 (1991)

DePaola, B.D., A Simple Apparatus for Demonstration of Gaseous Diffusion, Roger A. Key and B.D. DePaola; **29,** 522 (1991)

Derman, Samuel, Focusing Attention on the Parabolic Reflector (L); **29,** 327 (1991)

A Pointed Demonstration of Surface Tension; **29,** 414 (1991)

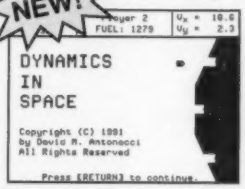
Derry, Gregory N., Capacitors in Parallel and Series, Helene F. Perry, Randall S. Jones, and Gregory N. Derry; **29,** 348 (1991)

de Villiers, Michael D., How Does the Wind Affect Road-Running Achievement? **29**, 286 (1991)
Dickie, L.O., The Transition from High School to College: An Impedance Mismatch? L.O. Dickie and J.E. Farrell; **29**, 440 (1991)
Dilsaver, John S., The Solar Swan Dive, John S. Dilsaver and Joseph R. Siler; **29**, 28 (1991)
Dodge, John H., There's More to It than Friction, Uri Haber-Schaim and John H. Dodge; **29**, 56 (1991)
Doebler, Robert, Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29**, 226 (1991)
Index of Refraction Using a Diffraction Pattern in a Fishtank, Simon George and Robert Doebler; **29**, 462 (1991)
Doran, Rodney L., Achievement of U.S. High-School Physics Students, Marilda S. Chandavarkar, Rodney L. Doran, and Willard J. Jacobson; **29**, 387 (1991)
Dotta-Dovidio, Randy, Center-of-Mass Baton, Manfred Bucher, Shengbo Zhu, and Randy Dotta-Dovidio; **29**, 74 (1991)
Downing, Harry D., Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29**, 369 (1991)
Eastlake, Charles, Boundary Layer Control on Airfoils, George Gerhab and Charles Eastlake; **29**, 150 (1991)
Edge, Ronald D., Crystal Sticks; **29**, 128 (1991)
Egler, Robert A., Capacitor Current-Voltage Phase Difference, Robert A. Egler and William M. Mauney; **29**, 398 (1991)
Ehrlich, Robert, A 100-Student 15-Minute Lab?; **29**, 586 (1991)
Eisenkraft, Arthur, *The Time and Space of Uncle Albert*, R. Stannard, Faber & Faber, London, 1989; Henry Holt, New York, 1990 (BR); **29**, 163 (1991)
Eisner, Milton P., Sidereal Time (L); **29**, 265 (1991)
Ellenstein, Marshall, "Ohmwork" or $\Omega\ F \times D$; **29**, 347 (1991)
Physics Educators and Mathematics Educators Should Work Together; **29**, 478 (1991)
Elsner, Kaye M., Spark Student Interest with a Piezoelectric Demonstration, Kaye M. Elsner and Craig Anderson; **29**, 510 (1991)
Emmanuel, Marion, Demonstrations Videos: Five More, William R. Warren and Marion Emmanuel; **29**, 405 (1991)
Epstein, Lewis, Wind Force and Wind Speed (L); **29**, 196 (1991)
Esbenshade, Donald H., Jr., Fractal Bread; **29**, 236 (1991)
Evans, Howard E., II, Raindrops Keep Falling on My Head...; **29**, 120 (1991)
Faller, J.E., A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; **29**, 468 (1991)
Farrell, Charlotte, A Sound-Wave Demonstrator—For about $10?; **29**, 185 (1991)
Farrell, J.E., The Transition from High School to College: An Impedance Mismatch? L.O. Dickie and J.E. Farrell; **29**, 440 (1991)
Feldman, Allan, The Speed of Light in Different Media; **29**, 112 (1991)
Feulner, John, Graphing with Computers in the Physics Lab; **29**, 126 (1991)
Ficken, George W., Jr., Convection-Driven Roasting Spits; **29**, 386 (1991)
Fleck, Robert C., Jr., Geometric Kinematics: The Method of Nicole Oresme; **29**, 410 (1991)
Flynn, Robert W., The Relativistic Velocity Addition Formula; **29**, 524 (1991)
Forinash, Kyle, Physics 100—Science Literacy; **29**, 448 (1991)
Fox, Kenneth, Force Components, the Last Straw; **29**, 118 (1991)
Frank, Michael T., Velocity of Sound in Solids, Michael T. Frank and Edward Kluk; **29**, 246 (1991)
Franz, Judy, The Robert A. Millikan Medal: Don Herbert; **29**, 488 (1991)
The Paul E. Klopsteg Memorial Lecture: Paul Hansma; **29**, 488 (1991)
Friedman, Alan J., In Defense of Science Museums (L); **29**, 422 (1991)
Fung-A-Fat, James, A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; 29, 468 (1991)
Galili, Igal, Pushing or Pulling? (L); **29**, 134 (1991)
Lenses, Pinholes, Screens, and the Eye, Fred Goldberg, Sharon Bendall, and Igal Galili; **29**, 221 (1991)
Some Reflections on Plane Mirrors and Images, Igal Galili, Fred Goldberg, and Sharon Bendall; **29**, 471 (1991)
Gardner, Martin, Transporting an Olive; **29**, 51 (1991)
Roly-Poly Folder; **29**, 107 (1991)
Stabbing an Eggshell; **29**, 149 (1991)
Where Does the Water Go? **29**, 241 (1991)
The Waltzing Eggshell; **29**, 315 (1991)
The Frustrating Papers; **29**, 416 (1991)
Balancing a Book; **29**, 460 (1991)
Dancing Triangle; **29**, 538 (1991)
The Enchanted Die; **29**, 587 (1991)
Garstang, R.H., How Hot Does Your Parked Car Become? **29**, 58 (1991)
Geballe, Ronald, The Double-Dactyl Solar System; **29**, 566 (1991)
More Double Dactyls; **29**, 592 (1991)
George, Simon, Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29**, 226 (1991)
Index of Refraction Uisng a Diffraction Pattern in a Fishtank, Simon George and Robert Doebler; **29**, 462 (1991)
Georgis, Nicholas J., "You Remind Me of My Father-in-Law"; **29**, 38 (1991)
Gerhab, George, Boundary Layer Control on Airfoils, George Gerhab and Charles Eastlake; **29**, 150 (1991)
Glaser, Jim, A Jolly Project for Teaching Hooke's Law; **29**, 164 (1991)
Goehl, John F., Jr., All the Answers (L); **29**, 70 (1991)
An Alternative Proof (L); **29**, 327 (1991)
Golab-Meyer, Zofia, "Piekara's Chair": Mechanical Model for Atomic Energy Levels; **29**, 215 (1991)
Goldberg, Fred, Lenses, Pinholes, Screens, and the Eye, Fred Goldberg, Sharon Bendall, and Igal Galili; **29**, 221 (1991)
Some Reflections on Plane Mirrors and Images, Igal Galili, Fred Goldberg, and Sharon Bendall; **29**, 471 (1991)
Gonzàlez, Alejandro D., Boundary Conditions in Elementary Mechanics; **29**, 590 (1991)
Gould, Laurence I., Estimating the Speed and Distance of an Airplane, Laurence I. Gould and Charles Waiveris; **29**, 108 (1991)
Gould, Mauri, A New Device for Studying Electric Fields, Gary Benoit and Mauri Gould; **29**, 182 (1991)
Graham, Andrew, Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 227 (1991)
Grant, Roderick, The Airplane Experiment, Lee Larson and Roderick Grant; **29**, 564 (1991)
Greenslade, T.B., Jr., Computer Modeling of Mirage Formation, J.F. Davis and T.B. Greenslade, Jr.; **29**, 47 (1991)
The EME Boyle's Law and Absolute Zero Apparatus; **29**, 116 (1991)
The Ballistic Pendulum; **29**, 415 (1991)
Groppe, Jennifer A., Physics by Analogy; **29**, 408 (1991)
Gruber, Alicia D., Space Curvature and the "Heavy Banana 'Paradox,'" Ronald P. Gruber, Alicia D. Gruber, Russell Hamilton, and Stephen M. Matthews; **29**, 147 (1991)
Gruber, Ronald P., Space Curvature and the "Heavy Banana 'Paradox,'" Ronald P. Gruber, Alicia D. Gruber, Russell Hamilton, and Stephen M. Matthews; **29**, 147 (1991)
Haber-Schaim, Uri, There's More to It than Friction, Uri Haber-Schaim and John H. Dodge; **29**, 56 (1991)
Halada, Richard S., Mystery, Physics, Logic, and Coffee Cans; **29**, 242 (1991)
Demonstrations of Infrared Ray Optics with Ray Guns; **29**, 370 (1991)
Electrons and Post-it™trons; **29**, 543 (1991)
Hamilton, Russell, Space Curvature and the "Heavy Banana 'Paradox,'" Ronald P. Gruber, Alicia D. Gruber, Russell Hamilton, and Stephen M. Matthews; **29**, 147 (1991)
Hansma, Paul, The Paul E. Klopsteg Memorial Lecture; **29**, 488 (1991)
Harpaz, Amos, The Formation of a Planetary Nebula; **29**, 268 (1991)
Harris, Sidney, Monopole Magnets Cartoon; **29**, 132 (1991)
Not Here—Next Door! Cartoon; **29**, 461 (1991)
Haugland, Ole Anton, Hot-Air Ballooning in Physics Teaching; **29**, 202 (1991)
Heim, Dan, Physics Haiku; **29**, 158 (1991)
Herbert, Don, The Robert A. Millikan Medal; **29**, 488 (1991)

Herreman, W., The Transient Phenomena of Force Vibrations; **29**, 187 (1991)
Herrera, O., Mechanical Device to Draw Lissajous Figures; **29**, 284 (1991)
Hetzel, Robert, Research on Science Laboratory Activities: In Pursuit of Better Questions and Answers to Improve Learning, K. Tobin, *Sch. Sci. and Math.*, May 1990 (GR); **29**, 26 (1991)
The NCTM Curriculum and Evaluation Standards for School Mathematics: A Science Educator's Perspective, H.O. Andersen, *Sch. Sci. and Math.*, Oct. 1990 (GR); **29**, 296 (1991)
Actual and Teacher Perceptions of the Abilities of Mathematical High School Chemistry Students in Minnesota, C.K. Bruce and F. Lawrenz, *Sch. Sci. and Math.*, Jan. 1991 (GR); **29**, 446 (1991)
Heubner, Jay S., Modifying Newton's Yo-Yo (L); **29**, 134 (1991)
Hewitt, Paul, Speed of the Wind; **29**, 49 (1991)
100-Volt Battery; **29**, 190 (1991)
Greater Force of Air Resistance; **29**, 514 (1991)
Hinton, Everett, RLC Phases (L); **29**, 550 (1991)
Hoffman, Dale T., A Cycloid Race; **29**, 395 (1991)
Holody, Paul, Study of Projectile Motion by Angular Momentum and Torque, B. Bagchi and Paul Holody; **29**, 376 (1991)
Holzman, Jerome, Low-cost Implosions; **29**, 429 (1991)
Huhn, James K., You Can Be Myopic and Still Survive on a Desert Island!; **29**, 577 (1991)
Hull, John R., Magnetic Levitation, Thomas D. Rossing and John R. Hull; **29**, 552 (1991)
Hunt, Robert G., The Physics of Popping Popcorn; **29**, 230 (1991)
Huston, Craig S., The "Sadly Cannot" Thermodynamic Cycle Revisited, David S. Mills and Craig S. Huston; **29**, 180 (1991)
Iona, Mario, Questionable Science; **29**, 19 (1991)
Problems with Principles of Physics; **29**, 314 (1991)
Levers for Premeds and Children; **29**, 354 (1991)
Science Fiction for Teachers; **29**, 528 (1991)
Jacobsen, Stephen P., What's an Ollie? Brian Broadt, Chris Necochea, and Stephen P. Jacobsen; **29**, 498 (1991)
Jacobson, Willard J., Achievement of U.S. High-School Physics Students, Marilda S. Chandavarkar, Rodney L. Doran, and Willard J. Jacobson; **29**, 387 (1991)
Jakuba, Stan, Effect of Exercise Expressed in Joules and Watts; **29**, 512 (1991)
Jewett, John W., Jr., Get the LED Out; **29**, 530 (1991)
DMV Physics—The Case of the Disappearing Time Intervals; **29**, 563 (1991)
Jones, Goronwy Tudor, The Physical Principles of Particle Detectors; **29**, 578 (1991)
Jones, Randall S., Capacitors in Parallel and Series, Helene F. Perry, Randall S. Jones, and Gregory N. Derry; **29**, 348 (1991)
Kagan, David T., The Ultimate "Pith Balls" (L); **29**, 197 (1991)
Kaiser, Edwin, Instantaneous Velocity: A Different Approach; **29**, 394 (1991)
Kalotas, T.M., Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)
Karlow, Edwin A., Let's Measure the Dielectric Constant of a Piece of Paper! **29**, 23 (1991)
Keenan, James E., Cow's Eye Dissection in the Physics Lab, David R. Lapp and James E. Keenan; **29**, 502 (1991)
Kernohan, James C., Red, White, Blue, and Black; **29**, 113 (1991)
Kettler, James E., Listening for Young's Modulus; **29**, 538 (1991)
Key, Roger A., A Simple Apparatus for Demonstration of Gaseous Diffusion, Roger A. Key and B.D. DePaola; **29**, 522 (1991)
Kiang, D., An Unavoidable Collision, T.W. Craig and D. Kiang; **29**, 290 (1991)
Kirkpatrick, Larry D., Time and the Big Dipper; **29**, 80 (1991)
Kluk, Edward, Velocity of Sound in Solids, Michael T. Frank and Edward Kluk; **29**, 246 (1991)
Ko, Raphael H., A Simple Experiment that Demonstrates Fractal Behavior, Raphael H. Ko and Charles P. Bean; **29**, 78 (1991)
Koch, David P., A Look Beyond; **29**, 59 (1991)
Slides: SETI; **29**, 573 (1991)
Kohli, D.K., Charge Amplifier Type of Flux Meter, B.D. Sukheeja and D.K. Kohli; **29**, 283 (1991)
Kroening, John L., Old Avogadro (L); **29**, 326 (1991)
Kruglak, Haym, Watch Your Pennies! **29**, 146 (1991)
Watch Your Pennies!—A Correction (L); **29**, 262 (1991)
Kuethe, Dean O., Confusion about Pressure; **29**, 20 (1991)
Kurtze, Douglas A., Teaching Newton's Second Law—A Better Way; **29**, 350 (1991)
Lagan, Seamus, A Simple Hallway Demonstration of Chaos; **29**, 461 (1991)
LaMaster, Patrick, On the Other Hand...; **29**, 18 (1991)
Saving Your Sonic Rangers from Being Smashed; **29**, 282 (1991)
Langabee, Joanne, Additional Uses for High Road/Low Road (L); **29**, 196 (1991)
Lapp, David R., Cow's Eye Dissection in the Physics Lab, David R. Lapp and James E. Keenan; **29**, 502 (1991)
Lark, Neil L., Daytime Observations for Astronomy Students—I and II; **29**, 459 (1991)
Daytime Observations for Astronomy Students—III; **29**, 500 (1991)
Larson, Lee, The Airplane Experiment, Lee Larson and Roderick Grant; **29**, 564 (1991)
Layton, William, A Different Light on an Old Electrostatics Demonstration; **29**, 50 (1991)
Lee, A.R., Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)
Leinoff, Stuart, Ray Tracing with Virtual Objects; **29**, 275 (1991)
Leung, Alfred F., Refractive Index of a Liquid Measured with a He-Ne Laser, Alfred F. Leung, Simon George, and Robert Doebler; **29**, 226 (1991)
Levy, Sal, The Sound of Cymbals Crashing; **29**, 272 (1991)
Lipman, Aharon, The V-Scope: An "Oscilloscope" for Motion, Miky Ronen and Aharon Lipman; **29**, 298 (1991)
Lovell, Paula, Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29**, 369 (1991)
Luzader, William, Slides: A Radio Astronomy View; **29**, 60 (1991)
A "High-Tech" Look with *Voyager*; **29**, 572 (1991)
Lynch, Maria A., A Tale of Human Power, Sandra K. McPhillips with Maria A. Lynch; **29**, 82 (1991)
Lynch, William B., First-Day Physics; **29**, 336 (1991)
Mathieson, D.L., The Tensile Strength of Paper; **29**, 412 (1991)
Matolyak, John, Teaching Important Procedures with Simple Experiments, George Matous and John Matolyak; **29**, 541 (1991)
Matous, George, Teaching Important Procedures with Simple Experiments, George Matous and John Matolyak; **29**, 541 (1991)
Matthews, Stephen M., Space Curvature and the "Heavy Banana 'Paradox,'" Ronald P. Gruber, Alicia D. Gruber, Russell Hamilton, and Stephen M. Matthews; **29**, 147 (1991)
Mauney, William M., Capacitor Current-Voltage Phase Difference, Robert A. Egler and William M. Mauney; **29**, 398 (1991)
McCambridge, Meredith B., A Straw Quartet; **29**, 571 (1991)
McCarthy, Thomas K., Two Cryogenic Demonstrations; **29**, 575 (1991)
McPhillips, Sandra K., A Tale of Human Power, Sandra K. McPhillips with Maria A. Lynch; **29**, 82 (1991)
McRae, Nora, Two Cultures (L), Nora McRae, Diane Watson, and Jacqueline Shaver; **29**, 548 (1991)
Melton, B.F., A Surprising Demonstration of Total Internal Reflection; **29**, 539 (1991)
Menon, V.J., Quasi-Static Processes: Some Natural Examples (L), D.C. Agrawal and V.J. Menon; **29**, 135 (1991)
Meyer, Joe P., Meet Your New President: Thomas D. Rossing; **29**, 72 (1991)
Miller, R.B., Einstein on Safari, T.M. Kalotas, A.R. Lee, and R.B. Miller; **29**, 122 (1991)
Miller, Robert, Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 227 (1991)
Mills, David S., The "Sadly Cannot" Thermodynamic Cycle Revisited, David S. Mills and Craig S. Huston; **29**, 180 (1991)
Miner, Thomas D., Physics Lore; **29**, 46, 200, 243 (1991)
The Art of Construction: Projects and Principles for Beginning Engineers

and Architects, M. Salvadori, Chicago Review Press, Chicago, 1990 (BR); **29**, 163 (1991)
Interests of Seventeenth-Century Scientists; **29**, 200 (1991)
Bohr the Writer; **29**, 243 (1991)
Mitchell, Robert, Determination of the Subsolar Point or (Where on Earth Is the Sun?); **29**, 318 (1991)
Morris, Stanley P., Effect of the Moment of Inertia of a Pulley (L); **29**, 265 (1991)
Morse, R.A., The Automatic Electrophorous; **29**, 225 (1991)
Mowat, J. Richard, Analysis of a Proposed Student Laboratory to Study Nonuniform Acceleration; **29**, 31 (1991)
Mowat Replies (L); **29**, 263 (1991)
Necochea, Chris, What's an Ollie? Brian Broadt, Chris Necochea, and Stephen P. Jacobsen; **29**, 498 (1991)
Neff, Robert F., Energy for Planet Earth, *Sci. Amer.*, Sept. 1990 (GR); **29**, 26 (1991)
The Woman Who Spins the Stars, M. Bartusiak, *Discover*, Oct. 1990 (GR); **29**, 26 (1991)
The Year in Science, *Discover*, Jan. 1991, special issue (GR); **29**, 296 (1991)
Rock and Roll Bridge, I. Peterson, *Sci. News*, June 2, 1990 (GR); **29**, 296 (1991)
Best of What's New, *Pop. Sci.*, Dec. 1990 (GR); **29**, 296 (1991)
Weird Science, D.H. Freedman, *Discover*, Nov. 1990 (GR); **29**, 296 (1991)
Nanotechnology: The Promise and Perils of Ultratiny Machines, J. Roland, *The Futurist*, March–April 1991 (GR); **29**, 446 (1991)
Newburgh, Ronald G., Jerk and the Rotating Observer (L); **29**, 484 (1991)
Nicklin, R.C., Optical Accessories for Optical Bench and Force Table, R.C. Nicklin, Robert Miller, and Andrew Graham; **29**, 227 (1991)
Oberhofer, E.S., Different Magnitude Differences; **29**, 273 (1991)
Olson, John, Function Recognition and Computerized Graphing; **29**, 293 (1991)
Opalko, Jane, Cross-Cultural Physics; **29**, 155 (1991)
Ormiston-Smith, Helen, Poetry in Ice and Spectra; **29**, 430 (1991)
Otani, Robert, Determining Absolute Zero in the Kitchen Sink, Robert Otani and Peter Siegel; **29**, 316 (1991)
Otto, Fred B., Three-Dimensional Lissajous Figures (L); **29**, 197 (1991)
Pack, Hughes, Light Color Mixing: A Convenient "On/Off" Switch; **29**, 313 (1991)
Padgett, Wendy T., The Long List and the Art of Solving Physics Problems; **29**, 238 (1991)
Page, Brian R., The Rocket Experiments of Robert H. Goddard, 1911 to 1930; **29**, 490 (1991)
Parry, Malcolm, Circular Arguments and American Slugs (L); **29**, 266 (1991)
Pasachoff, Jay M., Daylight Savings (L); **29**, 71 (1991)
Growth, Saturation, or Something Else? (L); **29**, 550 (1991)
Pascuzzi, Edward, *Totality: Eclipses of the Sun*, M. Littman and K. Willcox, Univ. of Hawaii Press, Honolulu, HI, 1991 (BR); **29**, 319 (1991)
Payne, Mark M., They're All False!—Or Are They? **29**, 145 (1991)
Does = Mean Equal? (L); **29**, 548 (1991)
Pernick, Benjamin J., Optimum Setting of a Slide Wire Wheatstone Bridge; **29**, 35 (1991)
Perry, Helene F., Capacitors in Parallel and Series, Helene F. Perry, Randall S. Jones, and Gregory N. Derry; **29**, 348 (1991)
Pinkerton, K. David, Interactive Hallway Physics for Elementary Schools; **29**, 166 (1991)
Laser Light Fantastic Lissajous Figures; **29**, 168 (1991)
Ponting, R. Lee, The Oscilloscope as a Primary Measurement Tool; **29**, 401 (1991)
Prigo, Robert, 2200 Years Later (L); **29**, 485 (1991)
Prytulak, Sam, Interdisciplinary Application (L); **29**, 135 (1991)
Raman, V.V., *Chandra: A Biography of S. Chandrasekhar*, K.C. Wali, Univ. of Chicago Press, 1991 (BR); **29**, 399 (1991)
Review Essay on *Moments in the Life of a Scientist*, B. Rossi, Cambridge Univ. Press, NY, 1990 (BR); **29**, 588 (1991)

NEW!
Physics Games



DYNAMICS IN SPACE is an educational game requiring the application of dynamics and kinematics. Using the force from small retrorockets, your students control the acceleration, velocity and position of their spaceship as they dock with a variety of space stations. Scoring, which rewards efficient fuel use, further challenges your students to analyze the relationships between force and motion.

In **VECTOR ADVENTURE**, your students apply their knowledge of kinematics, vectors and vector addition. By selecting appropriate velocities (both magnitude and direction), they steer their simulated ship toward long-lost pirate treasure while avoiding shoreline rocks and compensating for existing currents. Learn and have fun!

"...memorable and effective"
Mathematics Teacher (9/90)

30-day SATISFACTION GUARANTEE
Apple II versions $29.95 each or $49.95 for both

HIGHER-ORDER THINKING COMPANY
1733 NE Patterson Drive
Lee's Summit, MO 64063
(816) 524-2701

Ramsey, Gordon P., Reflective Properties of a Parabolic Mirror; **29**, 240 (1991)
Reid, Bill, Viewer for Brownian Motion; **29**, 52 (1991)
Bad Physics for Geographers; **29**, 154 (1991)
The Beer-Can Motor; **29**, 352 (1991)
Rheam, Harry, Absorption by Blue and Red Filters; **29**, 382 (1991)
Robb, N.I., Teaching Reflection from a Corner Cube Reflector; **29**, 255 (1991)
Rochon, P., The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29**, 214 (1991)
Roeder, John L., The Z Boson, M.S. Chanowitz, *Science*, July 6, 1990 (GR); **29**, 26 (1991)
Magnetic Confinement Fusion, H.P. Furth, *Science*, Sept. 28, 1990 (GR); **29**, 296 (1991)
General Relativity at 75: How Right Was Einstein? C.M. Will, *Science*, Nov. 9, 1990 (GR); **29**, 296 (1991)
Closing in on Einstein's Special Relativity Theory, R. Pool, *Science*, Nov. 30, 1990 (GR); **29**, 296 (1991)
Astrophysics from the Moon, B.F. Burke, *Science*, Dec. 7, 1990 (GR); **29**, 296 (1991)
Hybrid Ferromagnetic-Semiconductor Structures, G.A. Prinz, *Science*, Nov. 23, 1990 (GR); **29**, 296 (1991)
MRI—Safety Issues Stimulate Concern, L. Bain, *Science*, May 31, 1991 (GR); **29**, 446 (1991)
Magellan Paints a Portrait of Venus, R.A. Kerr, *Science* **251**, March 1, 1991 (GR); **29**, 446 (1991)
Science Literacy: The Enemy is Us, R. Pool, *Science* **251**, Jan. 18, 1991 (GR); **29**, 446 (1991)
Citizen Scientist, F. von Hippel, American Institute of Physics, NY, 1991 (BR); **29**, 588 (1991)
Rogoway, Raymond A., Meet Your Classmates in a Vector Contest; **29**, 102 (1991)
Romer, Robert H., The Mathematics of Exponential Growth—Keep It Simple! **29**, 344 (1991)

Ronen, Miky, The V-Scope: An "Oscilloscope" for Motion, Miky Ronen and Aharon Lipman; **29**, 298 (1991)
Rossing, Thomas D., Physics Boosters; **29**, 73 (1991)
Magnetic Images and J.C. Maxwell (L); **29**, 262 (1991)
Five "Christmas Lectures"; **29**, 404 (1991)
Magnetic Levitation, Thomas D. Rossing and John R. Hull; **29**, 552 (1991)
Ruby, Lawrence, If You Understand Leaky Buckets, You Understand a Lot of Physics; **29**, 44 (1991)
Sadler, Philip, Projecting Spectra for Classroom Investigations; **29**, 423 (1991)
Saferstein, Ben, Resurrecting the Pythagorean Monochord; **29**, 438 (1991)
Saltman, Scott, Equations Do What They're Told (L); **29**, 266 (1991)
Sandin, T.R., Make It Apparent (L); **29**, 327 (1991)
Schoch, Fritz, How to Measure g Easily with $\approx 10^{-4}$ Precision in the Beginners' Lab, Fritz Schoch and Walter Winiger; **29**, 98 (1991)
Schutter, John, Which Way Was that Paint Truck Moving?; **29**, 574 (1991)
Schwartz, John W., Apple Game-Port Timing, John W. Schwartz and Kathleen Bentzel; **29**, 535 (1991)
Sciamanda, Robert J., Nonuniform Acceleration Revisited (L); **29**, 263 (1991)
Secco, Richard A., Wave Interference Patterns Displayed on the Overhead Projector; **29**, 284 (1991)
Seeds, Mike, The Science of Scientific Writing, G.D. Gopen and J.A. Swan, *Am. Sci.*, Nov.-Dec. 1990 (GR); **29**, 296 (1991)
Seligmann, Peter, Squirt-Gun Scattering, Steven R. Thompson and Peter Seligmann; **29**, 62 (1991)
Shaver, Jacqueline, Two Cultures (L), Nora McRae, Diane Watson, and Jacqueline Shaver; **29**, 548 (1991)
Shea, Neil M., Estimating the Nuclear Radius; **29**, 237 (1991)
Shirer, Donald L., Not Quite Cricket (L); **29**, 262 (1991)
Shult, Donald E., Tone Holes and Frequency of Open Pipes; **29**, 16 (1991)
Checking of Laboratory Data; **29**, 256 (1991)
Siegel, Peter, Determining Absolute Zero in the Kitchen Sink, Robert Otani and Peter Siegel; **29**, 316 (1991)
Siler, Joseph R., The Solar Swan, John S. Dilsaver and Joseph R. Siler; **29**, 28 (1991)
Singleton, Terry, A Cooperative University-High School Modern Physics Laboratory Experience, David Austen, Wytze Brouwer, John Stephenson, and Terry Singleton; **29**, 14 (1991)
Slawsky, Milton M., The Slawsky Physics Clinic, Milton M. Slawsky and Zaka I. Slawsky; **29**, 244 (1991)
Slawsky, Zaka I., The Slawsky Physics Clinic, Milton M. Slawsky and Zaka I. Slawsky; **29**, 244 (1991)
Sobolewski, Stanley J., Student Bodies Exhibiting Constant Acceleration; **29**, 378 (1991)
Somers, P., The Complementary Pinhole Camera, D. Bissonnette, P. Rochon, and P. Somers; **29**, 214 (1991)
Speakman, Dick, Laser-Enhanced Vibrating String, John Abendschan and Dick Speakman; **29**, 115 (1991)
Sprott, J.C., Physics to the People! **29**, 212 (1991)
Stankevitz, James, Gamma Ray Observatory: The Next Great Observatory in Space, V. Neal, G. Fishman, and D. Kniffen, *Mercury*, July/Aug. 1990 (GR); **29**, 26 (1991)
Clarity (L); **29**, 70 (1991)
Stauffer, Frederic R., An Estimate of Avogadro's Number; **29**, 252 (1991)
Stephens, Peter W., *The Science of Sound*, 2nd ed., T.D. Rossing, Addison-Wesley, Reading, MA, 1990 (BR); **29**, 64 (1991)
Stephenson, John, A Cooperative University-High School Modern Physics Laboratory Experience, David Austen, Wytze Brouwer, John Stephenson, and Terry Singleton; **29**, 14 (1991)
Stewart, James E., The Collapsing Can Revisited; **29**, 144 (1991)
The Mystery of the Negative Pinhole; **29**, 520 (1991)
Stewart, Joseph V., Will AAPT Act? (L): **29**, 326 (1991)
Stewart, Maurice Bruce, The Regression of the Moon's Nodes: A Major Project in Introductory Astronomy; **29**, 160 (1991)
The Orbit of Mercury; **29**, 346 (1991)
Stinson, R.H., A Biconvex Diverging Lens; **29**, 592 (1991)
Stowe, Lawrence G., Should Physics Classes Be Single Sex? **29**, 380 (1991)
Street, J.G., A Simple Ink-Jet Gravimeter, J.G. Street, James Fung-A-Fat, and J.E. Faller; **29**, 468 (1991)
Sukheeja, B.D., Charge Amplifier Type of Flux Meter, B.D. Sukheeja and D.K. Kohli; **29**, 283 (1991)
Swartz, Clifford E., What the Student Saw; **29**, 12 (1991)
Ex Cathedra Editoris; **29**, 136 (1991)
More Sage Advice—The High-School Physics Course; **29**, 198 (1991)
Thomas D. Miner 1911-1991; **29**, 200 (1991)
Extracurricular Fun and Games; **29**, 260 (1991)
The Rumpelstiltskin Factor; **29**, 328 (1991)
Reference Frames; **29**, 420 (1991)
A Quantitative Misconception; **29**, 486 (1991)
Heroes; **29**, 576 (1991)
1991 Physics All-Stars—December Centerfold; **29**, centerfold (1991)
Tam, Patrick, Review of "Interactive Physics"; **29**, 383 (1991)
Thompson, Steven R., Squirt-Gun Scattering, Steven R. Thompson and Peter Seligmann; **29**, 62 (1991)
Throckmorton, Carl, What Teachers Should Know about Radon, Clifford Bettis and Carl Throckmorton; **29**, 338 (1991)
Toepker, Terrence P., More Physics Cents (L); **29**, 484 (1991)
More Beats (L); **29**, 548 (1991)
Toews, William, Shadow Patterns from Extended Light Sources; **29**, 280 (1991)
Tompson, C.W., Terminal Velocity on an Air Track, C.W. Tompson and J.L. Wragg; **29**, 178 (1991)
Touger, Jerold S., When Words Fail Us; **29**, 90 (1991)
Trikosko, Walter L., Ray Tracing for a Few $, Harry D. Downing, Walter L. Trikosko, and Paula Lovell; **29**, 369 (1991)
Vermillion, Robert E., Physics Banner; **29**, 355 (1991)
Wagner, William S., Temperature and Color of Incandescent Lamps; **29**, 176 (1991)
Waiveris, Charles, Estimating the Speed and Distance of an Airplane, Laurence I. Gould and Charles Waiveris; **29**, 108 (1991)
Walkiewicz, Thomas A., When Is a Problem Finished? Daryl Blakeslee and Thomas A. Walkiewicz; **29**, 464 (1991)
Wallingford, J., More on Mirage Formation (L); **29**, 485 (1991)
Warren, William R., Demonstrations Videos: Five More, William R. Warren and Marion Emmanuel; **29**, 405 (1991)
Watson, Diane, Two Cultures (L), Nora McRae, Diane Watson, and Jacqueline Shaver; **29**, 548 (1991)
Webb, Jerry, Thermodynamics in the Real World (L); **29**, 422 (1991)
Welborn, Jimilyn, The "Physics Is Fun" Program; **29**, 436 (1991)
Westphal, Patricia, "Hollywood Squares" Comes to the Physics Room; **29**, 208 (1991)
Wheeler, Gerald F., The Oersted Medal; **29**, 209 (1991)
Richtmyer Memorial Lecture; **29**, 209 (1991)
Distinguished Service Citations; **29**, 210 (1991)
Whineray, Scott, Bungi Jumping, Maglev Trains, and Misaligned Computer Monitors; **29**, 39 (1991)
Willey, David G., Conservation of Mechanical Energy Using a Pendulum; **29**, 567 (1991)
Winiger, Walter, How to Measure g Easily with $\approx 10^{-4}$ Precision in the Beginners' Lab, Fritz Schoch and Walter Winiger; **29**, 98 (1991)
Winters, Loren M., High-Speed Photography with Computer Control; **29**, 356 (1991)
Wirth, Frederick H., Holography and Introductory Science at Hampshire College; **29**, 138 (1991)
Wragg, J.L., Terminal Velocity on an Air Track, C.W. Tompson and J.L. Wragg; **29**, 178 (1991)
Yersel, Metin, A Simple Demonstration of Terminal Velocity; **29**, 334 (1991)
Zafiratos, Chris, Two Strings of Pearls, Albert A. Bartlett and Chris Zafiratos; **29**, 30 (1991)
Zandy, Hassan F., Summing Not Necessary (L); **29**, 550 (1991)
Zebrowski, Ernest, Jr., Physics Poetry in a Women's Prison; **29**, 536 (1991)
Zhu, Shengbo, Center-of-Mass Baton, Manfred Bucher, Shengbo Zhu, and Randy Dotta-Dovidio; **29**, 74 (1991)